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Programmable Logic Controller

Cnet I/F Module

XGT Series

User's Manual

XGL-CH2A

XGL-C22A

XGL-C24A

Safety Instructions

- Read this manual carefully before installing, wiring, operating, servicing or inspecting this equipment.
- Keep this manual within easy reach for quick reference.

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Safety Instructions

Before using the product …

For your safety and effective operation, please read the safety instructions thoroughly before using the product.

- Safety Instructions should always be observed in order to prevent accident or risk with the safe and proper use the product.

- Instructions are divided into “Warning” and “Caution”, and the meaning of the terms is as follows.

⚠ **Warning**	This symbol indicates the possibility of serious injury or death if some applicable instruction is violated
⚠ **Caution**	This symbol indicates the possibility of severe or slight injury, and property damages if some applicable instruction is violated

Moreover, even classified events under its caution category may develop into serious accidents relying on situations. Therefore we strongly advise users to observe all precautions properly just like warnings.

- The marks displayed on the product and in the user’s manual have the following meanings.

  ⚠ Be careful! Danger may be expected.

  ⚠ Be careful! Electric shock may occur.

- The user’s manual even after read shall be kept available and accessible to any user of the product.

Safety Instructions

Safety Instructions for design process

⚠Warning

- **Please install a protection circuit on the exterior of PLC so that the whole system may operate safely regardless of failures from external power or PLC.** Any abnormal output or operation from PLC may cause serious problems to safety in whole system.
  - Install protection units on the exterior of PLC like an interlock circuit that deals with opposite operations such as emergency stop, protection circuit, and forward/reverse rotation or install an interlock circuit that deals with high/low limit under its position controls.
  - If any system error (watch-dog timer error, module installation error, etc.) is detected during CPU operation in PLC, all output signals are designed to be turned off and stopped for safety. However, there are cases when output signals remain active due to device failures in Relay and TR which can't be detected. Thus, you are recommended to install an addition circuit to monitor the output status for those critical outputs which may cause significant problems.

- **Never overload more than rated current of output module nor allow to have a short circuit**. Over current for a long period time may cause a fire .

- **Never let the external power of the output circuit to be on earlier than PLC power**, which may cause accidents from abnormal output or operation.

- **Please install interlock circuits in the sequence program for safe operations in the system when exchange data with PLC or modify operation modes using a computer or other external equipments** Read specific instructions thoroughly when conducting control operations with PLC.

Safety Instructions

Safety Instructions for design process

⚠ Caution

- **I/O signal or communication line shall be wired at least 100mm away from a high-voltage cable or power line.** Fail to follow this instruction may cause malfunctions from noise

Safety Instructions on installation process

⚠ Caution

- **Use PLC only in the environment specified in PLC manual or general standard of data sheet.** If not, electric shock, fire, abnormal operation of the product may be caused.

- **Before install or remove the module, be sure PLC power is off.** If not, electric shock or damage on the product may be caused.

- **Be sure that every module is securely attached after adding a module or an extension connector.** If the product is installed loosely or incorrectly, abnormal operation, error or dropping may be caused. In addition, contact failures under poor cable installation will be causing malfunctions as well.

- **Be sure that screws get tighten securely under vibrating environments.** Fail to do so will put the product under direct vibrations which will cause electric shock, fire and abnormal operation.

- **Do not come in contact with conducting parts in each module**, which may cause electric shock, malfunctions or abnormal operation.

Safety Instructions

Safety Instructions for wiring process

⚠ Warning

- **Prior to wiring works, make sure that every power is turned off.** If not, electric shock or damage on the product may be caused.

- **After wiring process is done, make sure that terminal covers are installed properly before its use.** Fail to install the cover may cause electric shocks.

⚠ Caution

- **Check rated voltages and terminal arrangements in each product prior to its wiring process.** Applying incorrect voltages other than rated voltages and misarrangement among terminals may cause fire or malfunctions.

- **Secure terminal screws tightly applying with specified torque.** If the screws get loose, short circuit, fire or abnormal operation may be caused. Securing screws too tightly will cause damages to the module or malfunctions, short circuit, and dropping.

*

- **Be sure to earth to the ground using Class 3 wires for FG terminals which is exclusively used for PLC**. If the terminals not grounded correctly, abnormal operation or electric shock may be caused.

- **Don't let any foreign materials such as wiring waste inside the module while wiring,** which may cause fire, damage on the product or abnormal operation.

- **Make sure that pressed terminals get tighten following the specified torque. External connector type shall be pressed or soldered using proper equipments.**

Safety Instructions

Safety Instructions for test-operation and maintenance

⚠Warning

- **Don’t touch the terminal when powered**. Electric shock or abnormal operation may occur.
- **Prior to cleaning or tightening the terminal screws, let all the external power off including PLC power.** If not, electric shock or abnormal operation may occur.
- **Don’t let the battery recharged, disassembled, heated, short or soldered**. Heat, explosion or ignition may cause injuries or fire.

⚠Caution

- **Do not make modifications or disassemble each module.** Fire, electric shock or abnormal operation may occur.
- **Prior to installing or disassembling the module, let all the external power off including PLC power.** If not, electric shock or abnormal operation may occur.
- **Keep any wireless equipment such as walkie-talkie or cell phones at least 30cm away from PLC**. If not, abnormal operation may be caused.
- **When making a modification on programs or using run to modify functions under PLC operations, read and comprehend all contents in the manual fully.** Mismanagement will cause damages to products and accidents.
- **Avoid any physical impact to the battery and prevent it from dropping as well.** Damages to battery may cause leakage from its fluid. When battery was dropped or exposed under strong impact, never reuse the battery again. Moreover skilled workers are needed when exchanging batteries.

Safety Instructions

Safety Instructions for waste disposal

⚠ Caution

- **Product or battery waste shall be processed as industrial waste.**
  The waste may discharge toxic materials or explode itself.

Revision History

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V 1.0	’05.03	First Edition	-
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		(2) Software to use the product	1-4
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		2. CPU added	Ch1.3.2
		3. Content on the remote connection modified	Ch7.4.2
		4. Figure and figure number of modem communication modified	Ch7.5
V2.4	’11.05	1. How to enable link through flag added	CH6.7.2

※ The number of User’s manual is indicated right part of the back cover.

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Congratulations on purchasing PLC of LSIS Co.,Ltd.
Before use, make sure to carefully read and understand the User's Manual about the functions, performances, installation and programming of the product you purchased in order for correct use and importantly, let the end user and maintenance administrator to be provided with the User's Manual.

The User's Manual describes the product. If necessary, you may refer to the following description and order accordingly. In addition, you may connect our website (http://eng.lsis.biz/) and download the information as a PDF file.

Relevant User's Manuals

Title	Description
XG5000 User's Manual	XG5000 software user manual describing online function such as programming, print, monitoring, debugging by using XGK, XGB CPU
XG5000 User's Manual (for XGI, XGR)	XG5000 software user manual describing online function such as programming, print, monitoring, debugging by using XGI, XGR CPU
XGK/XGB Instructions & Programming User's Manual	User's manual for programming to explain how to use instructions that are used PLC system with XGK, XGB CPU.
XGI/XGR Instructions & Programming User's Manual	User's manual for programming to explain how to use instructions that are used PLC system with XGI, XGR CPU.
XGK CPU User's Manual (XGK-CPUA/CPUE/CPUH/CPUS/CPUU)	XGK-CPUA/CPUE/CPUH/CPUS/CPUU user manual describing about XGK CPU module, power module, base, IO module, specification of extension cable and system configuration, EMC standard
XGI CPU User's Manual (XGI-CPUU)	XGI-CPUU user manual describing about XGK CPU module, power module, base, IO module, specification of extension cable and system configuration, EMC standard
XGR redundant series User's Manual	XGR-CPUU user manual describing about XGR CPU module, power module, extension drive, base, IO module, specification of extension cable and system configuration, EMC standard

Current user manual of XGL-CH2A, C42A, C22A is written based on the following version.

Related OS version list

Product name	OS version
XGK-CPUH, CPUS, CPUA, CPUE, CPUU	V2.0
XGI-CPUU, CPUH	V2.1
XGR-CPUH/F, CPUH/T	V1.1
XG5000(XG-PD)	V2.4

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Chapter 1 Overview

1.1 Introduction

This user's manual describes the Computer Link I/F module (hereinafter referred to as Cnet I/F module) of XGT PLC system network. Cnet I/F module has the connection function with different model to communicate with communication devices of various different type protocols such as other company's PLC and computer, etc., and the function of modem communication to control remote PLC.

When programming, refer to the following user manual.

- XG5000 manual
- XGK instruction
- XGK manual
- XGI/XGR instruction
- XGI instruction
- XGI manual
- XGR manual

When configuring the system of the XGT Cnet I/F module, be careful of the followings.

- XGT PLC XG5000 programming tool: more than V2.0
- XG-PD: more than V2.3
- XGT Cnet I/F module OS: more than V2.3

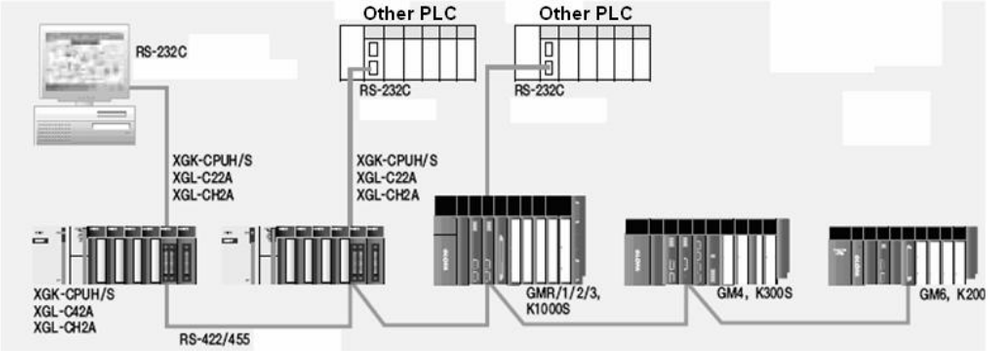
Note

1) This manual is written on a basis of XG5000 V2.0, XG-PD V2.3.
In case of previous version or different version, menu and method how to write a parameter may be different. Be careful of this.

1.2 Characteristics

The XGT Cnet I/F module is serial communication device supporting the RS-232C and RS-422(485) protocol and has the following characteristics.

(1) Since the user can write directly, it is easy to connect with other company's products
(2) Because communication speed and communication mode (protocol) are directly specified by user using XG-PD operative in Windows environment, connection with other company's products is easy.
(3) 3 types of Cnet I/F modules are available: RS-232C 2Port, RS-422(485) 2Port, RS-232C 1Port/ RS-422 1Port.
(4) With the separate operation based on each channel, the protocol data specified by user is controlled by CPU module, which allows the replaced communication module directly to be applied without additional setting or downloading.
(5) Read/Write is available by using the dedicated protocol.
(6) Dedicated communication function suitable to multi-drop configuration connectable up to 32 units is provided if RS-422/485 channel used.
(7) With modem communication function built-in, remote PLC can be controlled by XG5000 connection, dedicated communication, and user defined communication.
(8) Various communication speeds can be set
- RS-232C : 300bps ~ 115,200bps / RS-422 : 300bps ~ 115,200bps.
(9) 1:1/1:N/N:M communication(if RS-422 channel used) is available.
(10) Communication types of full-duplex (RS-422/RS-232C) and half-duplex (RS-485) are supported.
(11) With satisfactory self-diagnosis function and Loop-Back diagnosis function, diagnosis of errors is easy to make.
(12) Dedicated communication and Modbus Server/Client functions are available.
(13) Remote connection during communication between XGT Cnet I/F modules is available. Note1)



Note

Note1) Remote connection during communication between XGT Cnet I/F modules is supported when O/S version of XGT Cnet I/F module is 2.5 or above. Features are as follows.
(1) For communication type, only RS-232C, RS-422 method is supported. In case of remote connection using RS-485, remote connection is only available when the P2P link on the online menu of XG-PD is disabled.
(2) Remote connection is supported regardless of active mode.
(3) Remote connection during communication is affected according to TRX period and an amount of data
- In case TRX period is short or amount of data is huge, disconnection may occur.

1.3 Product Configuration

1.3.1 Type name indication

Describes on the product configuration of the XGT Cnet module

Type name	Contents	Reference
XGL-C22A	RS-232C 2 ports	Twisted-pair shield cable
XGL-CH2A	RS-232C 1 port, RS-422 1 port	
XGL-C42A	RS-422 2 ports	

1.3.2 Equip-able number per CPU

Note1) The Cnet I/F module can be mounted up to 24 without distinction of basic and extension base. To realize the maximum capacity of communication module, if possible, mount the communication module in the basic base. The following table indicates the available service type according to CPU. Apply it when configuring the system.

Classification	XGK					XGI			XGR	
	CPUH	CPUU	CPUA	CPUS	CPUE	CPUU	CPUH	CPUS	CPUH/T	CPUH/F
Max. no. of module using high speed link	Not used									
Max. no. of module using P2P	8 EA									
Max. no. of module using dedicated service	24 EA									

Note

Note1) equipment position of Cnet I/F module according to CPU type
- In case of using XGK/XGI, You can install Cnet I/F module at both basic and extension base.
- In case of using XGR CPU, You can install Cnet I/F module at only extension base.

1.4 Software to use the product

Here describe on main programming tool and other software to use the Cnet module. For more specific program and application of communication, refer to the followings.

1.4.1 Software check point

(1) Applied at the XGT series

Classification	Connection port	Communication setting tool
XGL-C22A	RS-232C 2 ports	XG-PD
XGL-CH2A	RS-232C 1 port, RS-422 1 port	
XGL-C42A	RS-422 2 ports	

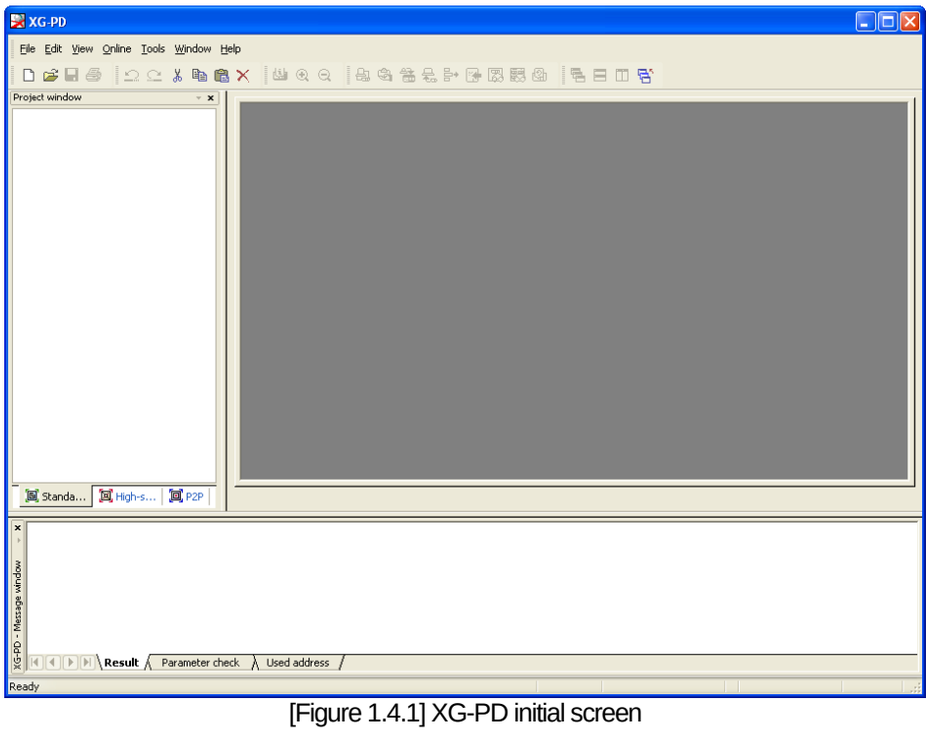
Note

1) The above program can be downloaded from our website now. In case of not using the internet, visit the near our company and get the CD.
   Internet web address : http://eng.lsis.biz
2) XG5000 and XG-PD is programmable through the RS-23C port of CPU module and USB. For the used cable name, refer to the XGT catalog item list. (USB-301A, K1C-050A)

1.4.2 XG-PD

XG-PD is dedicated software for setting of basic parameter, writing of frame and diagnosis of all communication module including the Cnet I/F module.

The following figure is initial screen of XG-PD.



[Figure 1.4.1] XG-PD initial screen

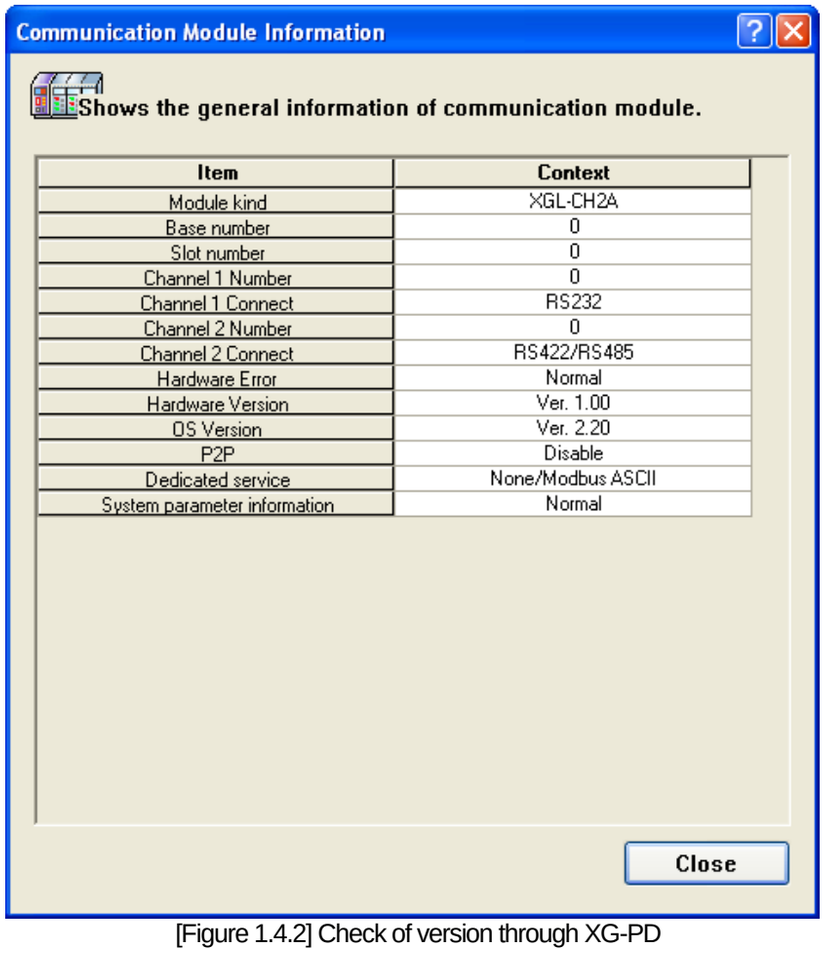
1.4.3 Check of version

Before using the Cnet module, check the version of module.

(1) Check through XG-PD

Here describes on how to read communication module information by online connection to communication module. If interface with CPU is normal, it is available to get the following information.

(a) Execute the XG-PD.
(b) Connect with CPU through online connection.
(c) If connection with CPU is established, execute the system diagnosis.
(d) Execute the Communication module information in the system diagnosis screen.
(e) Software information shows at the right bottom of screen.



[Figure 1.4.2] Check of version through XG-PD

(2) Check of version through the case label of the product

Each communication module has the product information label on the case. If online check is not possible, see the label on the case after removing it from base.
Label is in the back of the case and type name of product and version information is indicated.

Chapter 2 Product Specifications

2.1 General Specifications

General specifications of XGT series are as follows.

<table>
<tr><th>No.</th><th>Items</th><th colspan="6">Specifications</th><th>Related standards</th></tr>
<tr><td>1</td><td>Ambient temperature</td><td colspan="6">0 ~ 55 °C</td><td></td></tr>
<tr><td>2</td><td>Storage temperature</td><td colspan="6">–25 ~ +70 °C</td><td></td></tr>
<tr><td>3</td><td>Ambient humidity</td><td colspan="6">5 ~ 95%RH (Non-condensing)</td><td></td></tr>
<tr><td>4</td><td>Storage humidity</td><td colspan="6">5 ~ 95%RH (Non-condensing)</td><td></td></tr>
<tr><td rowspan="9">5</td><td rowspan="9">Vibration resistance</td><td colspan="5">Occasional vibration</td><td>-</td><td></td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td>Amplitude</td><td>times</td><td rowspan="9">IEC61131-2</td></tr>
<tr><td>10 ≤ f < 57Hz</td><td colspan="2">–</td><td>0.075mm</td><td rowspan="6">10 times each directions (X, Y and Z)</td></tr>
<tr><td>57 ≤ f ≤ 150Hz</td><td colspan="2">9.8m/s^2(1G)</td><td>–</td></tr>
<tr><td colspan="5">Continuous vibration</td></tr>
<tr><td>Frequency</td><td colspan="2">Acceleration</td><td>Amplitude</td></tr>
<tr><td>10 ≤ f < 57Hz</td><td colspan="2">–</td><td>0.035mm</td></tr>
<tr><td>57 ≤ f ≤ 150Hz</td><td colspan="2">4.9m/s^2(0.5G)</td><td>–</td></tr>
<tr><td>6</td><td>Shock resistance</td><td colspan="6">• Peak acceleration: 147 m/s^2(15G)
• Duration: 11ms
• Half-sine, 3 times each direction per each axis</td><td>IEC61131-2</td></tr>
<tr><td rowspan="5">7</td><td rowspan="5">Noise resistance</td><td>Square wave Impulse noise</td><td colspan="5">±1,500 V</td><td>LSIS standard</td></tr>
<tr><td>Electrostatic discharge</td><td colspan="5">4kV (Contact discharge)</td><td>IEC61131-2
IEC61000-4-2</td></tr>
<tr><td>Radiated electromagnetic field noise</td><td colspan="5">80 ~ 1,000 MHz, 10V/m</td><td>IEC61131-2,
IEC61000-4-3</td></tr>
<tr><td rowspan="2">Fast transient/bust noise</td><td>Segment</td><td>Power supply module</td><td colspan="3">Digital/analog input/output communication interface</td><td rowspan="2">IEC61131-2
IEC61000-4-4</td></tr>
<tr><td>Voltage</td><td>2kV</td><td colspan="3">1kV</td></tr>
<tr><td>8</td><td>Environment</td><td colspan="6">Free from corrosive gasses and excessive dust</td><td></td></tr>
<tr><td>9</td><td>Altitude</td><td colspan="6">Up to 2,000 ms</td><td></td></tr>
<tr><td>10</td><td>Pollution degree</td><td colspan="6">2 or less</td><td></td></tr>
<tr><td>11</td><td>Cooling</td><td colspan="6">Air-cooling</td><td></td></tr>
</table>

[Table 2.1] General Specifications

Note

1) IEC (International Electrotechnical Commission):
An international nongovernmental organization which promotes internationally cooperated standardization in electric/electronic field, publishes international standards and manages applicable estimation system related with.

2) Pollution degree:
An index indicating pollution degree of the operating environment which decides insulation performance of the devices. For instance, Pollution degree 2 indicates the state generally that only non-conductive pollution occurs. However, this state contains temporary conduction due to dew produced.

2.2 Performance Specifications

<table>
<tr><td colspan="2" rowspan="2">Item</td><td colspan="3">Specification</td></tr>
<tr><td>XGL-C22A</td><td>XGL-CH2A</td><td>XGL-C42A</td></tr>
<tr><td rowspan="4">Serial communicat-ion channel</td><td rowspan="2">RS-232C</td><td>2 channels</td><td>1 channel</td><td rowspan="2">-</td></tr>
<tr><td colspan="2">Conforms to RS-232C standard</td></tr>
<tr><td rowspan="2">RS-422/485</td><td rowspan="2">-</td><td>1 channel</td><td>2 channels</td></tr>
<tr><td colspan="2">Conforms to RS-422/485 standards</td></tr>
<tr><td colspan="2">Modem connection function</td><td colspan="2">Remote communication with external devices is available via public telephone line by connecting external modem to the module.</td><td>-</td></tr>
<tr><td rowspan="2">Operating mode (specified per port)</td><td>P2P</td><td colspan="3">Operated by communication client
Protocol client exclusively used for LSIS,
Modbus ASCII/RTU client
Use defined communication available</td></tr>
<tr><td>SEVER</td><td colspan="3">Protocol server exclusively used for LSIS
Modbus ASCII/RTU sever</td></tr>
<tr><td rowspan="3">Data type</td><td>Data Bit</td><td colspan="3">7 or 8</td></tr>
<tr><td>Stop Bit</td><td colspan="3">1 or 2</td></tr>
<tr><td>Parity</td><td colspan="3">Even/Odd/None</td></tr>
<tr><td colspan="2">Synchronization type</td><td colspan="3">Asynchronous type</td></tr>
<tr><td colspan="2">Transmission speed (bps)</td><td colspan="3">300/600/1200/2400/4800/7200/9600
/19200/38400/57600/64000/115200 bps available</td></tr>
<tr><td colspan="2">Station No. setting</td><td colspan="3">Setting range : 0-31
Max. station No. available : 32 stations</td></tr>
<tr><td colspan="2" rowspan="2">Transmission distance</td><td colspan="2">RS-232C: Max.15m (extendible if modem used)</td><td>-</td></tr>
<tr><td>-</td><td colspan="2">RS-422: Max. 500m</td></tr>
<tr><td colspan="2">Diagnosis function</td><td colspan="3">Checking available through LED and XG-PD diagnosis service
Loop-Back diagnosis</td></tr>
<tr><td colspan="2">Current consumption</td><td>310mA</td><td>310mA</td><td>300mA</td></tr>
<tr><td colspan="2">Weight</td><td>121g</td><td>119g</td><td>116g</td></tr>
</table>

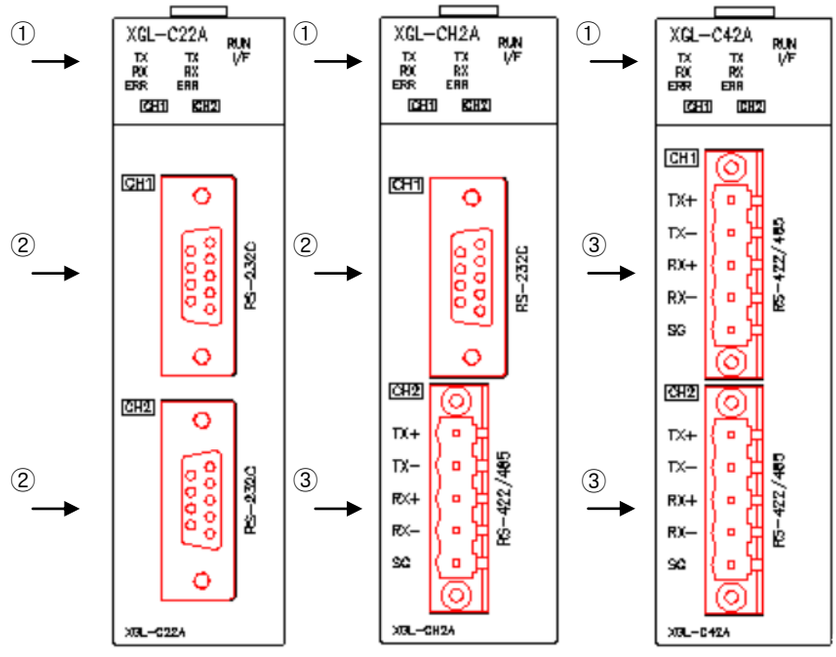
[Table 2.2] Performance Specifications

Note

(1) You can install Cnet I/F module at extension base in XGR system. Namely, you can't use it at basic base.

2.3 Designations of Parts

Designations of parts are as follows;



[Fig. 2.3.1] Cnet I/F Module, Front

<Name of each part>

	Name	Contents
①	LED	Refer to the LED details
②	RS-232C interface	RS-232C interface to communicate with other device through serial
③	RS-422/485 interface	RS-422/485 interface to communicate with other device through serial

<LED details>

LED	LED details	LED status	Details of LED status
RUN	Displays Cnet operation status	On	Operation normal
		Off	Cnet module abnormal
I/F	Displays interface status with CPU	On	Operation abnormal during communication with CPU module
		Off	Communication module initializing error
		Blinks	Operation normal
TX	Displays frame being transmitted	On	Frame being transmitted
		Off	Frame transmitted completely
RX	Displays frame being received	On	Frame being received
		Off	Frame received completely
ERR	Displays frame error	On	Frame error
		Off	Frame normal

2.4 Cable Specifications

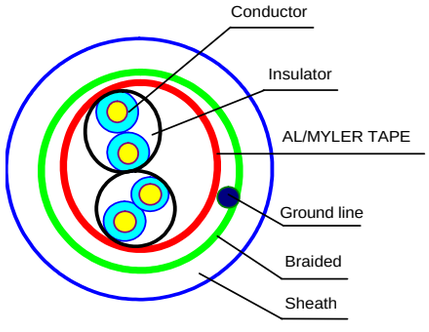
When using communication channel, RS-422 or RS-485, twisted pair cable for RS-422 shall be used in consideration of communication distance and speed. [Table 2.4] describes recommended specifications of cable. Also when using other cable than recommended, the cable conforming to characteristics in [Table 2.4] shall be used.

(1) Product : Low Capacitance LAN Interface Cable
(2) Type : LIREV-AMESB
(3) Size : 2P X 22AWG(D/0.254 TA)
(4) Manufacturer: LS Cable

	Test item	Unit	Characteristics	Test conditions
Electric characteristics	Conductor resistance	Ω/km	59 or less	Normal temp.
	Withstanding voltage(DC)	V/1min	Withstands for 1 min. at 500V	In air
	Insulation resistance	MΩ-km	1,000 or more	Normal temp
	Static electricity capacity	Pf/M	45 or less	1kHz
	Characteristics impedance	Ω	120 ± 12	10MHz

	Item			Single Cable
Characteristics of appearance.	Conductor	Cores	Pair	2
		Size	AWG	22
		Composition	NO./mm	1/0.643
		Outer dia.	mm	0.643
	Insulator	Thickness	mm	0.59
		Outer dia.	mm	1.94

[Table 2.4.1] Standard of Twisted Pair Cable



[Fig. 2.4.1] Structure

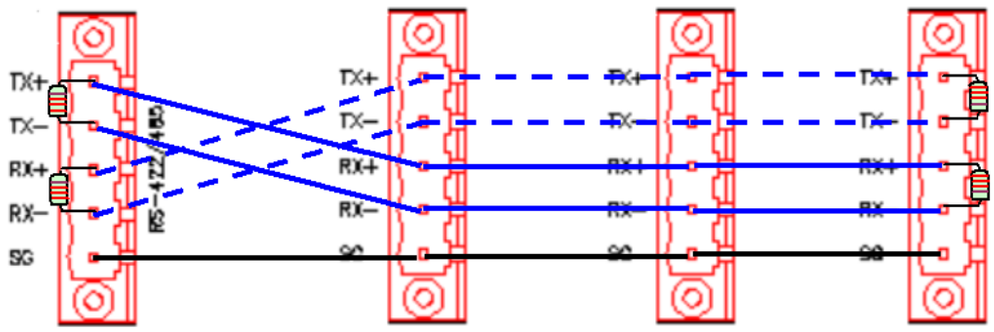
2.5 Terminal Resistance

For communication via RS-422/RS-485 channel, terminal resistance from external must be connected. Terminal resistance has the function to prevent distortion of signal by reflected wave of cable for long-distance communication, and the same resistance (1/2W) as characteristic impedance of cable must be connected to terminal of network.

When using the recommended cable in 2.4, connect terminal resistance of 120Ω to both ends of cable. Also when using other cable than recommended, the same resistance (1/2W) as characteristic impedance of cable must be connected to both ends of cable.

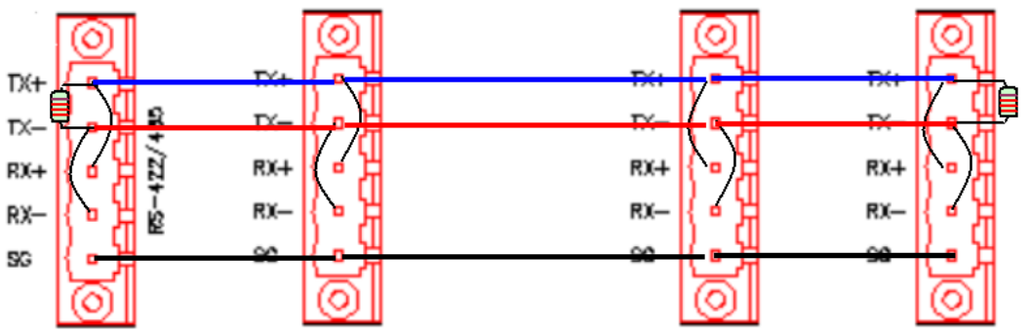
▶ Terminal Resistance: 1/2W, 120Ω, tolerance of 5%

(1) How to connect with terminal resistance during RS-422 connection



[Fig. 2.5.1] RS-422 connection with Terminal Resistance

(2) How to connect with terminal resistance during RS-485 connection



[Fig. 2.5.2] RS-485 connection with Terminal Resistance

Chapter 3 Performance Specifications

3.1 Operation Mode Setting

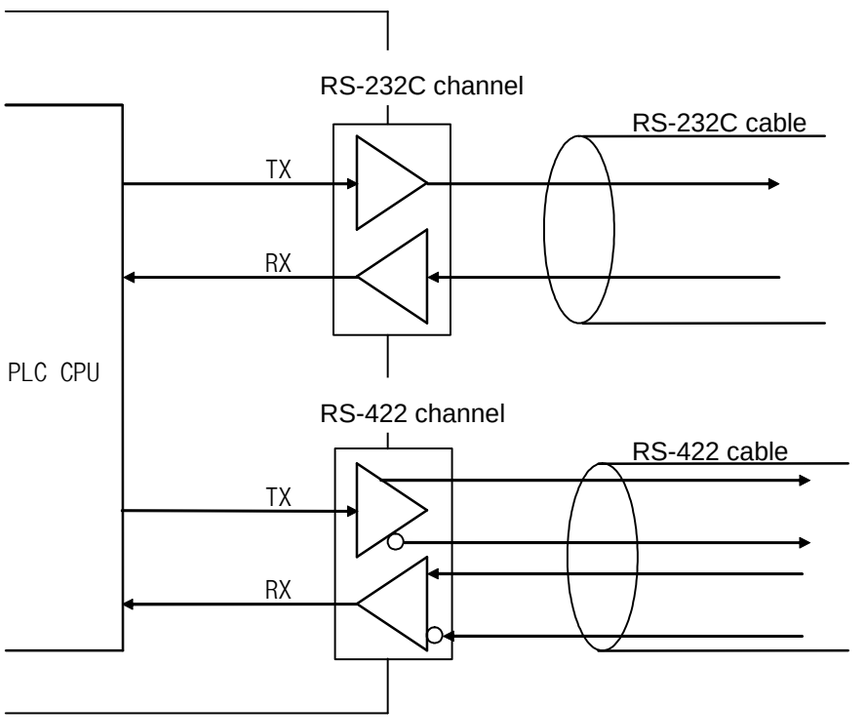
The operation mode of XGT Cnet is decided by the basic communication parameters. It operates separately from each communication port with the operation modes available as described below.

(1) Server Mode
Operates as a server in the network. XGT server and Modbus server are optional.
(a) XGT server: dedicated communication protocol supported, memory Read/Write available.
(b) Modbus server: Modbus protocol supported, RTU/ASCII type optional.
(c) Setting necessary for conversion between Modbus protocol memory area and XGT memory area.
(d) XG5000 service (remote 1/2 step connection) functions supported at a time.

(2) P2P (Client) Mode
(a) Operates as a client in the network.
(b) Dedicated communication protocol and Modbus protocol supported.
(c) Up to 64 communication blocks can be specified for 1 Cnet module to define the independent operation.

3.2 Channel Operation during Normal Run

Each communication port operates independently to allow simultaneous Tx/Rx in separate transmission specifications. Therefore, transmission specifications can be set per RS-232C and RS-422 channel, and the operation is started and stopped according to channels. Data flow of each channel is as below.



[Fig. 3.2.1] Data Flow of Each Channel

Notes

[Note 1] Mode change during operation is unavailable. In order to change the mode, download the basic communication parameters and reset the communication module.

[Note 2] Cnet I/F module supports only the separate mode.

3.3 Channel Operation in Diagnosis Mode (Loop-Back)

Loop-Back diagnosis is a function to check if communication channel normally operates by itself without connection with external devices, which is available when the diagnosis service is executed. For the details of its operation method, see 'Chapter 9 Diagnosis Function'.

3.4 Method of Serial Interface

3.4.1 RS-232C Interface

Channel RS-232C uses 9-pin connector (Female) for communication with external devices. The names and functions of pins and data directions are as shown in the figure below.

Pin No.	Name	Contents	Signal Direction (Cnet I/F module ↔ external device)	Description
1	CD	Carrier Detect	←	Reports carrier detection of DCE to DTE
2	RxD	Received Data	←	Received data signal
3	TxD	Transmitted Data	→	Transmitted data signal
4	DTR	Data Terminal Ready	→	Reports ready communication of DTE[Note1] to DCE[Note2]
5	SG	Signal Ground	↔	Ground line for signal
6	DSR	Data Set Ready	←	Reports ready communication of DCE to DTE
7	RTS	Request To Send	←	DTE asks DCE to send data
8	CTS	Clear To Send	→	DCE asks DTE to send data
9	RI	Ring	←	Reports ringing tone received from DCE to DTE

[Fig. 3.4.1] RS-232C 9-pin Connector Standard

Channel RS-232C can communicate with external devices directly and also with remote communication devices using modem. When connecting modem, communication type of RS-232C must be set to 'modem' with XG-PD, and when not using modem, it must be set to null modem

Notes

[Note1] DTE: Data Terminal Equipment (Cnet I/F module)

[Note2] DCE: Data Communication Equipment (external modem)

(1) How to connect RS-232C connector during modem connection

This module can communicate with devices of long distance as connected with modem. Modem and RS-232C channel shall be connected as in [Fig. 3.4.2] below.

Cnet (9-PIN)		Connection No. and signal direction	Modem side (25-PIN)	
Pin No.	Name		Name	Pin No.
1	CD	←	CD	8
2	RXD	←	RXD	3
3	TXD	→	TXD	2
4	DTR	→	DTR	20
5	SG	—	SG	7
6	DSR	←	DSR	6
7	RTS	→	RTS	4
8	CTS	←	CTS	5
9	RI[Note]		RI	22

[Fig 3.4.2] Cable Connection between RS-232C and Modem

[Note] No.9, RI signal is not used in Cnet I/F module.

(2) How to connect connector for RS-232C in null modem mode

In null modem mode, the connector can be connected in 3-line type as below.

Cnet (9-PIN)		Connection No. and signal direction	Computer/communication devices
Pin No.	Name		Name
1	CD		CD
2	RXD	↔	RXD
3	TXD	↔	TXD
4	DTR		DTR
5	SG	—	SG
6	DSR		DSR
7	RTS		RTS
8	CTS		CTS
9	RI		RI

[Fig. 3.4.3] 3-line Type of Connection (no handshake)

3.4.2 RS-422/485 interface

Channel RS-422 uses 5-pin connector (Terminal Block) for communication with external devices. The names and functions of pins and data directions are as shown in [Fig. 3.5] below

Pin No.	Name	Signal Direction (Cnet<--> external device)	Description
1	TX+	→	Transmitted data (+)
2	TX-	→	Transmitted data (-)
3	RX+	←	Received data (+)
4	RX-	←	Received data (-)
5	S.G(SG)	—	Ground line for signal

[Fig. 3.4.4] RS-422 5-pin Connector Standard

Channel RS-422 is designed available to connect RS-422 and RS-485(multi-drop) with external devices. When RS-422 channel is used as multi-drop, set each channel's communication type to RS-485 on the basic setting menu of XG-PD, and use the terminal of RS-422 connected as shown in [Fig. 3.7].
[Fig. 3.4.5] shows an example of connecting communication cable in RS-422 communication

Cnet(5-Pin)		Signal Direction (Cnet<---> external device)	External communication device
Pin No.	Name		
1	TX+	→	RX+
2	TX-	→	RX-
3	RX+	←	TX+
4	RX-	←	TX-
5	S.G(SG)	↔	S.G

[Fig. 3.4.5] RS-422 Connection

Cnet(5-Pin)		Signal Direction (Cnet<---> external device)	External communication device
Pin No.	Name		
1	TX+	↔	RX+
2	TX-		RX-
3	RX+	↔	TX+
4	RX-		TX-
5	S.G(SG)		S.G

[Fig. 3.4.6] RS-485 Connection

[Fig. 3.4.6] shows how to connect RS-485 multi-drop communication. In case of multi-drop communication, to connect with external devices, TX+ and RX+, RX- and TX- of RS-422 channel shall be connected with each other. At this time half-duplex communication is run sharing Tx/Rx line, so the applicable port shall be applied as set to RS-485 in XG-PD.

Chapter 4 Installation and Test Operation

4.1 Installation Environment

This product is of high reliance regardless of installation environment. However, for the sake of reliance and stability of the system, please pay attention to those precautions described below.

(1) Environmental Conditions

(a) To be installed on the control panel waterproof and dustproof.

(b) No continuous impact or vibration shall be expected.

(c) Not to be exposed to the direct sunlight.

(d) No dew shall be caused by rapid temperature change.

(e) Ambient temperature shall be kept 0-55℃.

(2) Installation Work

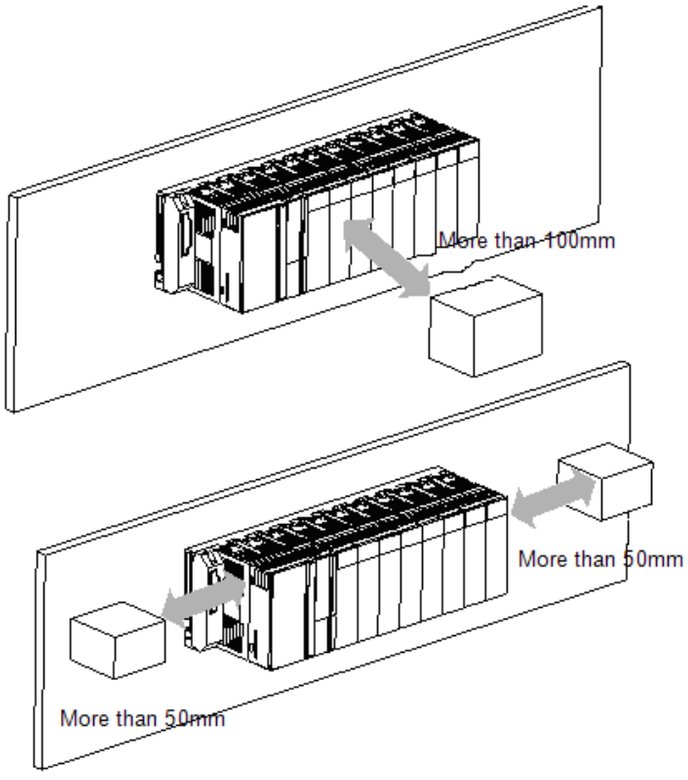
(a) No wiring waste is allowed inside PLC when wiring or drilling screw holes.

(b) To be installed on a good location to work on.

(c) Don't let it installed on the same panel as a high-voltage device is on.

(d) Let it kept at least 50 ㎜ away from duct or near-by module.

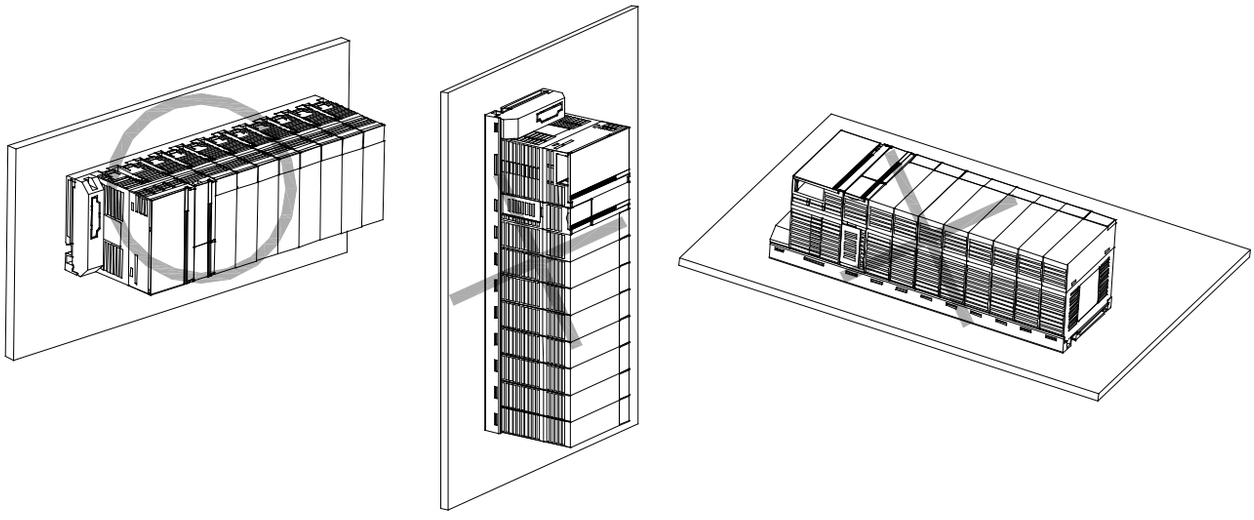
(e) To be grounded in an agreeable place free from noise.



4.2 Precautions for Handling

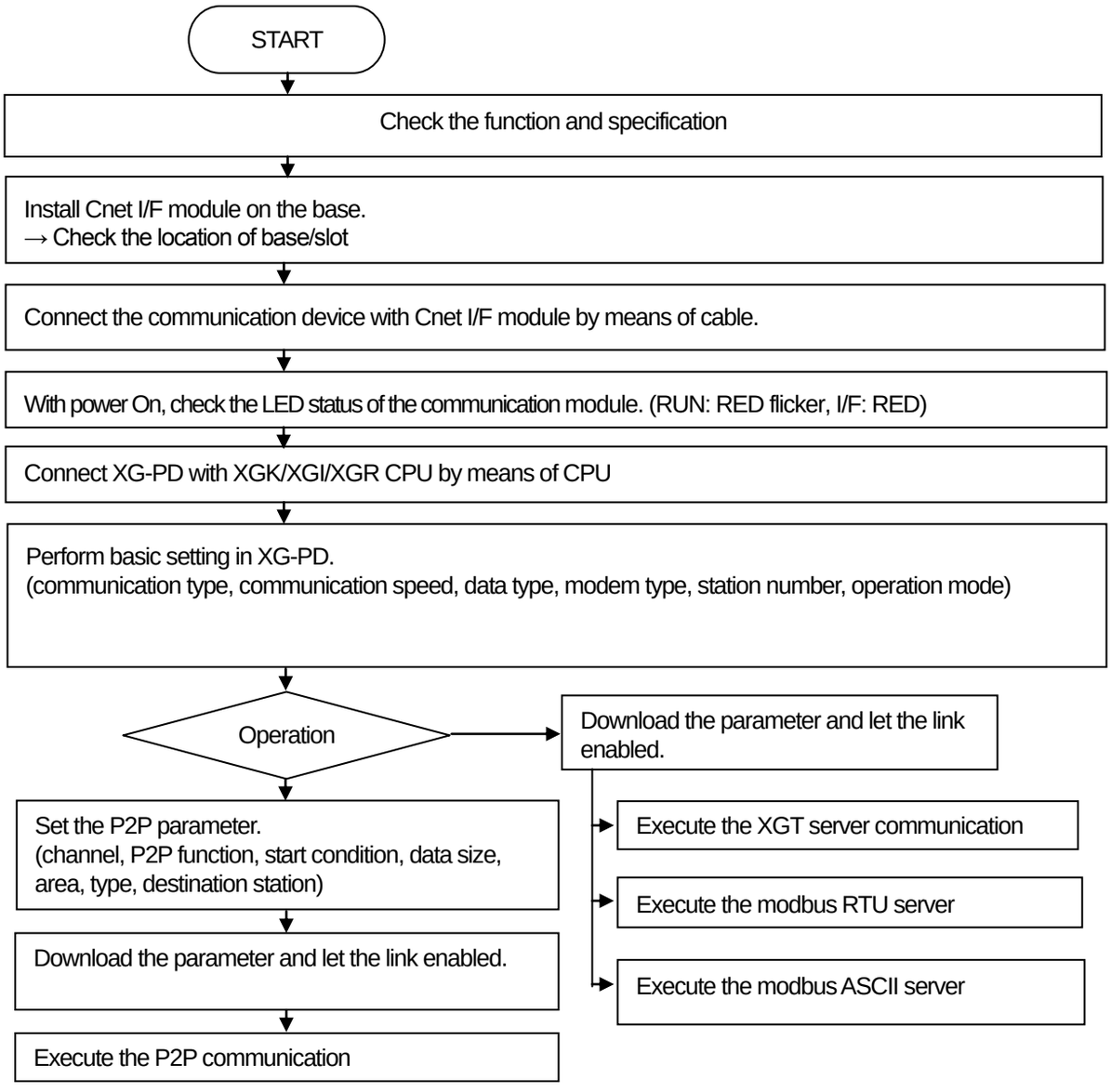
The system configuration with Cnet I/F module shall be performed under the following precautions.

1) Don't let it dropped or shocked hard.
2) Don't remove PCB from the case. It will cause abnormal operation.
3) Don't let any foreign materials including wiring waste inside the top of the module when wiring.
4) Get rid of foreign materials if any.
5) Don't install or remove the module while powered on.
6) Use standard cable only and let it installed within the maximum distance specified.
7) Let the communication cable free from the surge and inductive noise generated by or from the alternating current.
8) Don't let wiring too close to hot device and material or in direct contact with oil for long, which will cause damage or abnormal operation due to short-circuit.
9) For wiring with pipes, the pipes need grounding.



4.3 Operation Sequence

The sequence of the product from installation to operation will be described below. After the product installation is complete, install and configure the system to be operated as specified in the following sequence.


START
Check the function and specification
Install Cnet I/F module on the base.
→ Check the location of base/slot
Connect the communication device with Cnet I/F module by means of cable.
With power On, check the LED status of the communication module. (RUN: RED flicker, I/F: RED)
Connect XG-PD with XGK/XGI/XGR CPU by means of CPU
Perform basic setting in XG-PD.
(communication type, communication speed, data type, modem type, station number, operation mode)
Operation
Download the parameter and let the link enabled.
Execute the XGT server communication
Execute the modbus RTU server
Execute the modbus ASCII server
Set the P2P parameter.
(channel, P2P function, start condition, data size, area, type, destination station)
Download the parameter and let the link enabled.
Execute the P2P communication

Notes

1) Station number of Cnet I/F module is not necessary to set due to hardware properties.
Use XG-PD to specify basic settings necessary for station number and Cnet communication.

4.4 Contents of Parameter Setting in the XG-PD

Contents of parameter setting in XG-PD are as follows.

4.4.1 Basic setting parameter

Parameter	Lower menu	Setting item	Setting range	Setting right		Reference
				Client	Server	
Basic setting	Connection setting	Communication type	RS-232C RS-422 RS-485	○	○	
		Communication speed (bps)	300~1,15,200	○	○	
		Data bit	7,8	○	○	Modbus ASCII In case of modbus, data bit is 7.
		Stop bit	1,2	○	○	
		Parity bit	NONE,ODD,EVEN	○	○	
		Modem type	Null modem, dedicated modem, dial up modem	○	○	
		Modem initialization	-	○	○	Setting available in case of dial up modem
		STATION	0~31	○	○	No meaning in case of client
		Delay time	0~2550ms	○	-	Used in case of P2P
		Time out	0~5000ms	○	-	Used in case of P2P
	Operation mode	Use P2P settings	Select one mode	○	-	
		XGT server		-	○	
		Modbus ASCII server		-	○	
		Modbus RTU server		-	○	

Note

(1) Response waiting time: waiting time from sending to receiving
  (a) Operation setting: Settable in case operation mode is Use P2P.
  (b) basic response waiting time per communication speed
    1) 9,600~115,200bps : 100ms+(setting value×100ms)
    2) 7,200~2,400bps : 200ms+(setting value×100ms)
    3) 1,800~1,200bps : 400ms+(setting value×100ms)
    4) 600bps : 800ms+(setting value×100ms)
    5) 300bps : 1,200ms+(setting value×100ms)
(2) Delay time setting: sends frame after delay time set by user
  (a) Operation setting: settable in case communication type is RS-422/485
(3) Delay time between character: In case of character coming within set time at one frame, it means character interval between character
  (a) Operation setting: settable regardless of operation mode

4.4.2 P2P setting parameter

Parameter	Lower menu	Setting item	Setting range and contents		Setting right (client)			
					XGT	Modbus ASCII	Modbus RTU	User definition frame
P2P	Communication module setting	Base	0~7		○	○	○	○
		Slot	0~11		○	○	○	○
	P2P channel	P2P driver	User frame definition		-	-	-	○
			XGT client		○	-	-	-
			Modbus ASCII Client		-	○	-	-
			Modbus RTU Client		-	-	○	
	P2P block	Channel	1, 2		○	○	○	○
		P2P function	READ		○	○	○	-
			WRITE		○	○	○	-
			SEND		-	-	-	○
			RECEIVE		-	-	-	○
		Conditional flag *note 1)			○	○	○	○
		Command type	Single		○	○	○	-
			Continuous		○	○	○	-
		Data type	Bit		○	○	○	-
			Word		○	○	○	-
			1 byte		○	-	-	-
			2 byte		○	-	-	-
			4 byte		○	-	-	-
			8 byte		○	-	-	-
		No. of variable*note2)			○	○	○	-
		Data size*note2)			○	○	○	-
		Destination station			○	○	○	-
		Destination station no.			○	○	○	-
		Frame			-	-		○
		Setting*note3)			○	○	○	○
	User definition frame	Add group	Group name		-	-	-	
			Frame type	Transmission	-	-	-	○
				reception	-	-	-	○
	Frame*Note4)	Edit group	Group name		-	-	-	○
		Delete group			-	-	-	○
		Add frame	HEAD		-	-	-	○
			TAIL		-	-	-	○
			BODY		-	-	-	○

Note

1) Conditional flag can be set when P2P function is 'SEND' in case of user definition frame communication.
2) No. of variable and data size can be set when command type is 'Continuous' at the XGT client, Modbus ASCII/RTU client.
3) Setting can be set when selecting the fix sized variable or variable sized variable in case of user definition frame communication.
4) Frame setting is available after setting the group name and frame type of user definition frame.

4.5 I/O Assignment and Device Information

4.5.1 I/O assignment

(1) When using the XGK CPU

(a) How to configure the basic system

The characteristic of basic system consisting of basic and extension base is as follows. The number of extension base is different according to CPU type and there are fixed type and changeable methods on I/O assignment.

Classification	XGK-CPUE	XGK-CPUS	XGK-CPUA	XGK-CPUH	XGK-CPUU
Max. extension no.	1	3	3	7	7
Max. equip-able I/O module no.	24	48	48	96	96
Max. I/O point	1,536	3,072	3,072	6,144	6,144
Max. extension distance	15m				

(b) Assignment of I/O point (fixed type)

1) 64 I/O points are assigned to each slot regardless of module.
2) 1024 (64*16) I/O points are assigned to each base. Namely no. 1 base's start number is P00640. (Refer to 2.3.2)
3) The example of I/O assignment of 12 slot base is as follows.

Slot no.		0	1	2	3	4	5	6	7	8	9	10	11
PWR	CPU	IO16	IO16	IO32	IO64	IO16	IO32	IO32	IO64	IO32	IO16	IO32	IO32
		P0~P3F	P40~P7F	P80~P11F	P120~P15F	P160~P19F	P200~P23F	P240~P27F	P280~P31F	P320~P35F	P360~P39F	P400~P43F	P440~P47F

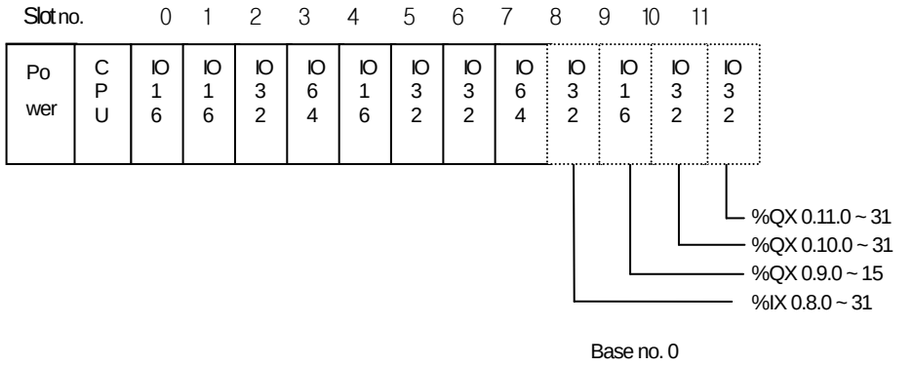
(c) Assignment of I/O point (Changeable type)

1) The point changes according to each module equipped at the slot.
2) If there is no module, designated point is assigned.
3) The slot not designated by I/O parameter is assigned according to the equipped module automatically. (8 points module is assigned as 16 points.)
4) The empty slot not designated by I/O parameter is assigned as 16 points.
5) It is possible to set the points without designation of module.
6) 16 points is assigned at the slot where special and communication module is equipped.
7) The example of assignment of I/O point for 12 slot base is as follows.

Slot no.		0	1	2	3	4	5	6	7	8	9	10	11
PWR	CPU	IO16	IO16	IO32	IO64	IO16	IO32	IO32	IO64	IO32	IO16	IO32	IO32
		P00~P0F	P10~P1F	P20~P3F	P40~P7F	P80~P8F	P90~P10F	P110~P12F	P130~P16F	P170~P18F	P190~P19F	P200~P21F	P220~P23F

(2) When using the XGI CPU

(a) How to configure the basic system

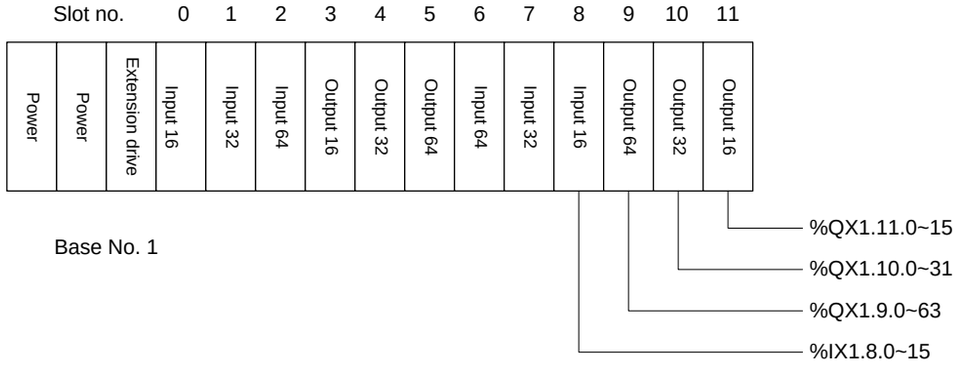
Classification	XGI-CPUU
Max. extension no.	7
Max. equip-able IO module no.	96
Max. IO points	• In case of 16 points module: 1,536 point • In case of 32 points module: 3,072 point • In case of 64 points module: 6,144 point
Max. extension distance	15m
	• IO number is assigned as 64 point per each slot by fixed type. • 64 point is assigned to each slot regardless of module. • No limit to slot location and number of special module • Fixed IO no. is not assigned to special module unlike the digital IO. • Special module is controlled by dedicated function block and memory is assigned automatically. • IO assignment example of 12 Slot base is as follows. 

Note

1) Basic base no. is fixed as '0' and extension base no. is flexible by the setting switch.
2) Module type set by I/O parameter should be same with module type really equipped.

(3) When using the XGR CPU

(a) How to configure the basic system

Classification	XGR-CPUU
Configuration of basic base	• Install basic base of same configuration double
Max. extension base	• Available to install 1~31 extension bases
Max. equip-able IO module no.	• Available to install up to 372 at extension base
Max. IO points	• In case of 16 points module: 5,952 point • In case of 32 points module: 11,904 point • In case of 64 points module: 23,808 point
Max. extension distance	• Between base - Optical: 2 ㎞ - Electricity: 100 m • Total max. distance - Optical: 64 ㎞(When configuring 31 extension bases) - Electricity: 3.2 ㎞ (When configuring 31 extension bases)
IO number allocation of extension base	• IO number start value of each base is determined by base number set in extension drive module. (1~31) • IO number in base is fixed as 64 per slot. Each slot is allocated 64 points regardless of module equipment and type • Special module doesn't use IO number to control unlike digital IO module. It uses U device and dedicated function block • IO number allocation of 12 slot base is as follows. 
IO number of basic base	• IO number doesn't have meaning in basic base because only communication module can be equipped. • Thought basic base doesn't use IO number, it is allocated same with 12 slot extension base. • Base number of basic base is 0 and it is positioned at the first of IO number.

Note

(1) Redundant basic base is fixed as '0'. In the extension base, there is switch to set base number.
(2) Redundant CPU can be installed at basic base.
(3) Redundant CPU is CPU module occupying two slots.
(4) In order to start, module type set by IO parameter should be same with real equipped module type.
(5) Cnet I/F module can be equipped at extension module.
(6) When remote connection by using Cnet I/F module, station number of extension drive available to connection is limited 1~15.

4.5.2 Device information

(1) Basic setting

Communication type	Communication speed	Data bit	Stop bit	Parity bit	Model type	Modem initialization	Station no.	Response waiting time	Delay time	Waiting time between character
RS-232C	300~115200	7~8	1~2	NONE~ODD	Null modem	Disable	0~31	0~50	0~255	0~255
					Dedicated modem	Disable	0~31	0~50	0~255	0~255
					Dial up modem	Enable	0~31	0~50	0~255	0~255
RS-485	300~115200	7~8	1~2	NONE~ODD	Null modem	Disable	0~31	0~50	0~255	0~255
					Dedicated modem	Disable	0~31	0~50	0~255	0~255
					Dial up modem	Disable	0~31	0~50	0~255	0~255
RS-422	300~115200	7~8	1~2	NONE~ODD	Null modem	Disable	0~31	0~50	0~255	0~255
					Dedicated modem	Disable	0~31	0~50	0~255	0~255
					Dial up modem	Disable	0~31	0~50	0~255	0~255

(2) Modbus setting

Channel	Modbus Use or not	Setting	Items	Default per CPU		
				XGK	XGI	XGR
Channel 1	Use P2P	Disable	-	-	-	-
	XGT server	Disable	-	-	-	-
	Modbus ASCII server	Enable	Start address of Reading Bit:	P00000	%IX0.0.0	%IX0.0.0
			Start address of Writing Bit:	P01000	%QX0.0.0	%QX0.0.0
			Start address of Reading Word:	P0200	%MW0	%MW0
			Start address of Writing Word:	P0300	%MW100	%MW100
	Modbus RTU server	Enable	Start address of Reading Bit:	P00000	%IX0.0.0	%IX0.0.0
			Start address of Writing Bit:	P01000	%QX0.0.0	%QX0.0.0
			Start address of Reading Word:	P0200	%MW0	%MW0
			Start address of Writing Word:	P0300	%MW100	%MW100
Channel 2	Use P2P	Disable	-	-	-	-
	XGT server	Disable	-	-	-	-
	Modbus ASCII server	Enable	Start address of Reading Bit:	P04000	%IX0.0.0	%IX0.0.0
			Start address of Writing Bit:	P05000	%QX0.0.0	%QX0.0.0
			Start address of Reading Word:	P0600	%MW0	%MW0
			Start address of Writing Word:	P0700	%MW100	%MW100
	Modbus RTU server	Enable	Start address of Reading Bit:	P04000	%IX0.0.0	%IX0.0.0
			Start address of Writing Bit:	P05000	%QX0.0.0	%QX0.0.0
			Start address of Reading Word:	P0600	%MW0	%MW0
			Start address of Writing Word:	P0700	%MW100	%MW100

(3) P2P channel setting

Channel	Operation mode	P2P driver	TCP/UDP	Client/ Server	Partner port	Partner IP address
1	Basic setting operation mode	-	-	-	-	-
2	Basic setting operation mode	-	-	-	-	-

Channel	Operation mode	P2P driver	TCP/UDP	Client/ Server	Partner port	Partner IP address
1	XGT server	-	-	-	-	-
2	Use P2P	XGT client	-	-	-	-
		User definition frame	-	-	-	-
		Modbus ASCII client	-	-	-	-
		Modbus RTU client	-	-	-	-

(4) P2P block setting

Operational mode	P2P driver	P2P function	Conditional flag	Command type	Data type	No. of variable	Data size	Destination no.	Read area	Save area	address
XGT server	-	-	-	-	-	-	-	-	-	-	-
Use P2P	XGT Client	Read	XGT device	Single	BIT	1 ~ 4	Disable	0~32	XGT device	XGT device	How to calculate the N device
				Single	1/2/4/8 (XGK) B/W/D/L (XGI)	1 ~ 4					
				Continuous	1/2/4/8 (XGK) B/W/D/L (XGI)	Disable (1)	1 ~ 120				
		Write		Single	BIT	1 ~ 4	Disable				
				Single	1/2/4/8 (XGK) B/W/D/L (XGI)	1 ~ 4					
				Continuous	1/2/4/8 (XGK) B/W/D/L (XGI)	Disable(1)	1 ~ 120				
	Modbus ASCII client	Read		Single	BIT		Disable		00000 ~ 19999		
				Single	WORD				30000 ~ 49999		
				Continuous	BIT		1 ~ 976		00000 ~ 19999		
				Continuous	WORD		1 ~ 61		30000 ~ 49999		
		Write		Single	BIT		Disable		XGT device	00000 ~ 09999	
				Single	WORD					40000 ~ 49999	
				Continuous	BIT		1~944			00000 ~ 09999	
				Continuous	WORD		1~59			40000 ~ 49999	
	Modbus RTU client	Read		Single	BIT		Disable		00000 ~ 19999	XGT device	
				Single	WORD				30000 ~ 49999		
				Continuous	BIT		1 ~ 2000		00000 ~ 19999		
				Continuous	WORD		1 ~ 125		30000 ~ 49999		
		Write		Single	BIT		Disable		XGT device	00000 ~ 09999	
				Single	WORD					40000 ~ 49999	
				Continuous	BIT		1~1968			00000 ~ 09999	
				Continuous	WORD		1~123			40000 ~ 49999	
	User definition frame	SEND		Send body	-	-	1 ~ 1024		XGT device variable sized variable	-	
		RECEIVE	-	Receive body	-	-	-		-	Memory designation	

(5) User definition frame

Group	Frame	Segment	Reference
Transmission 1	HEAD	Numerical constant	Max. 10Byte 12345678901234567890
		String constant	1234567890 (Saved as 3132..30)
	TAIL	Numerical constant	Max. 10Byte 12345678901234567890
		String constant	1234567890 (Saved as 3132..30)
		BCC	-
	BODY	Numerical constant	Max. 10Byte 12345678901234567890
		String constant	1234567890 (Saved as 3132..30)
		Variable sized variable	Up to 4
Reception 1	HEAD	Numerical constant	Max. 10Byte 12345678901234567890
		String constant	1234567890 (Saved as 3132..30)
	TAIL	Numerical constant	Max. 10Byte 12345678901234567890
		String constant	1234567890 (Saved as 3132..30)
		BCC	-
	BODY	Numerical constant	Max. 10Byte 12345678901234567890
		String constant	1234567890 (Saved as 3132..30)
		Fix sized variable	Up to 4
		Variable sized variable	It is available to set only one variable sized variable. So it is impossible to add segment after variable sized variable
There is no number limit to group, frame, segment but size (0x4B00).			

4.5.3 Available device area per CPU series

CPU type	Area	Range	Size (word)	Reference
XGK	P	P0~P2047	2048	Read/Write/Monitor available
	M	M0~M2047	2048	Read/Write/Monitor available
	K	K0~K2047	2048	Read/Write/Monitor available
	F	F0~F2047	2048	Read/Monitor available (Write: available from 1025 word)
	T	T0~T2047	2048	Read/Write/Monitor available
	C	C0~2047	2048	Read/Write/Monitor available
	L	L0~L11263	11264	Read/Write/Monitor available
	N	N0~N21503	21504	Read/Write/Monitor available
	D	D0~D32767	32768	Read/Write/Monitor available, XGK–CPUH
		D0~D19999	20000	Read/Write/Monitor available, XGK–CPUS
	R	R0~R32767	32768	Read/Write/Monitor available
	ZR	ZR0~ZR65535	65536	Read/Write/Monitor available
XGI	I	IW0.0.0~IW127.15.3	8192	Read/Write/Monitor available
	Q	QW0.0.0~QW127.15.3	8192	Read/Write/Monitor available
	M	MW0~MW131071	131072	Read/Write/Monitor available
	R	RW0~RW32767	32768	Read/Write/Monitor available
	W	WW0~WW65535	65536	Read/Write/Monitor available
XGR	I	IW0.0.0~IW127.15.3	8192	Read/Write/Monitor available
	Q	QW0.0.0~QW127.15.3	8192	Read/Write/Monitor available
	M	MW0~MW131071	131072	Read/Write/Monitor available
	R	RW0~RW32767	32768	Read/Write/Monitor available
	W	WW0~WW65535	65536	Read/Write/Monitor available
Common	U	U0~U4095	4096	Monitor available

Note

(1) ZR device is available only at XGK-CPUH.
(2) ZR device should request by using “W”.
Ex) When requesting word size from ZR0, you should request as “%WW000”.
(3) At U device, address of bit monitoring is hexadecimal and monitoring address of word area is decimal.

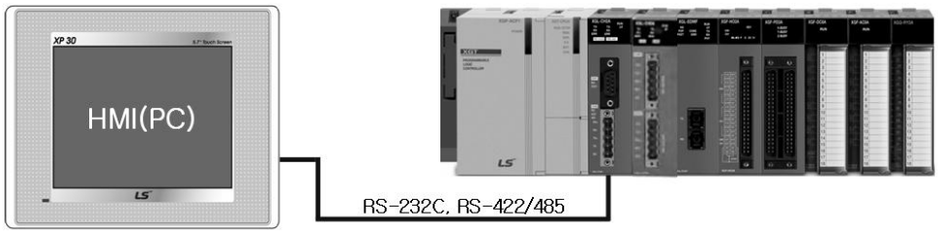
Chapter 5 System Configuration

Cnet I/F module is used for CPUH and CPUS both. Up to 24 modules can be mounted on the main and expansion bases, and all 24 modules can be used using a dedicated protocol. However, only 8 modules are available to use P2P service.
Various communication systems can be configured via this module in accordance with application fields. This chapter describes examples of system configurations which are available or unavailable for the application fields.

5.1 Available System Configurations

5.1.1 1:1 connection (no modem) to PC (HMI)

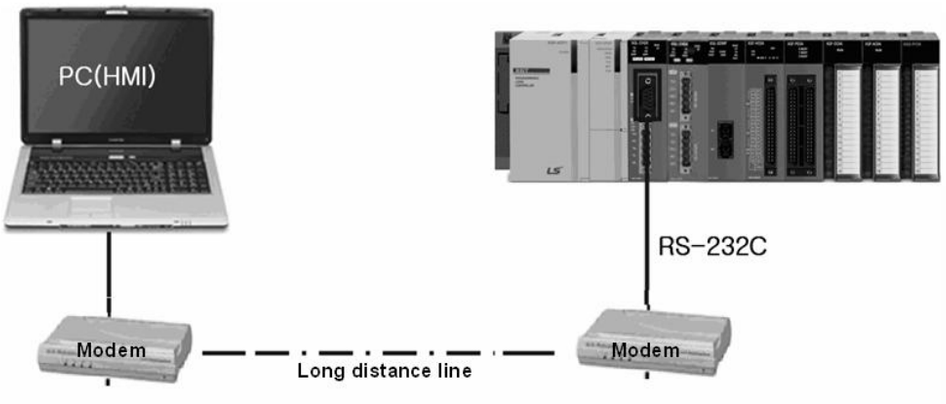
PC(HMI) and Cnet I/F module are connected via RS-232C or RS-422 channel in 1:1 connection system with PC (HMI) or PLC not through modem. Most PC(HMI)s are operated as client stations and Cnet I/F modules are operated as sever stations that respond the request of PC(HMI). Since no modem is applied, communication distance is max.15m via RS-232C channel and max.500m via RS-422 channel. Operation mode of Cnet I/F module shall be set as agreed with communication type of PC(HMI).



[Fig. 5.1.1] 1:1 communication system with PC

5.1.2 1:1 dedicated modem connection to PC (HMI)

PC(HMI) and the module are connected through dedicated modem via RS-232C channel in 1:1 connection system. Most PC(HMI)s are operated as client stations and Cnet I/F modules are operated as sever stations that respond the request of PC(HMI). Since modem is applied to go through, RS-232C channel shall be set to dedicated modem for long-distance communication. Operation mode of this module shall be set as agreed with communication type of PC(HMI).



[Fig. 5.1.2] Dedicated modem communication with PC

5.1.3 Modem connection to PC & Communication between Cnet I/F modules

(1) PC and Cnet #1 station are connected through modem via RS-232C channel.

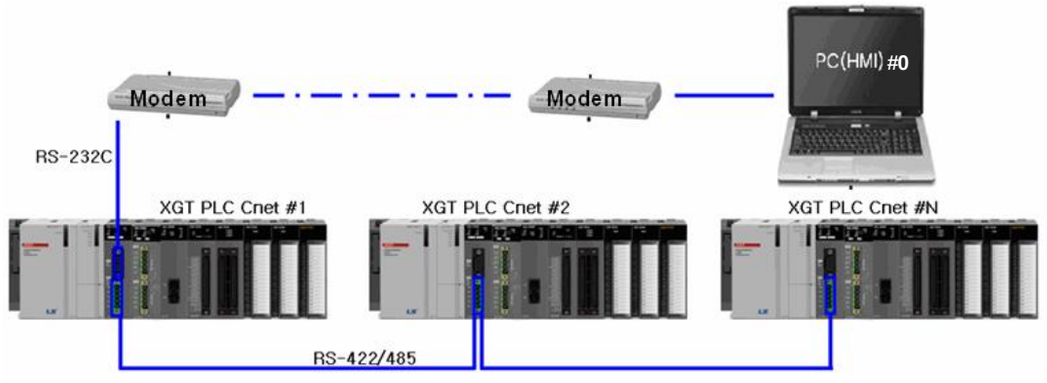
(2) Cnet #1 station ~ N station carry out communication between Cnet I/F modules via RS-422 channel.

(3) PC is operated as client station of Cnet #1 station.

(4) Cnet I/F module can connect with max. 32 stations (RS-422/485 communication).

(5) RS-232C channel of Cnet I/F module is set to sever station and RS-422 channel of Cnet I/F module is set to client station.

(6) Dedicated modem or dial-up modem is available to use.



[Fig. 5.1.3] Dedicated modem communication with PC

Type	Module setting		
	RS-232C	RS-422	Station No.
PLC Cnet #1 station	XGT Server	P2P	1
		XGT Client	
Cnet #2~#31 station	Not used	XGT Server	2~31

[Table 5.1.1] Module Setting Table for Station No.

5.1.4 Dedicated communication with PC (HMI) & Other company's RS-422 communication

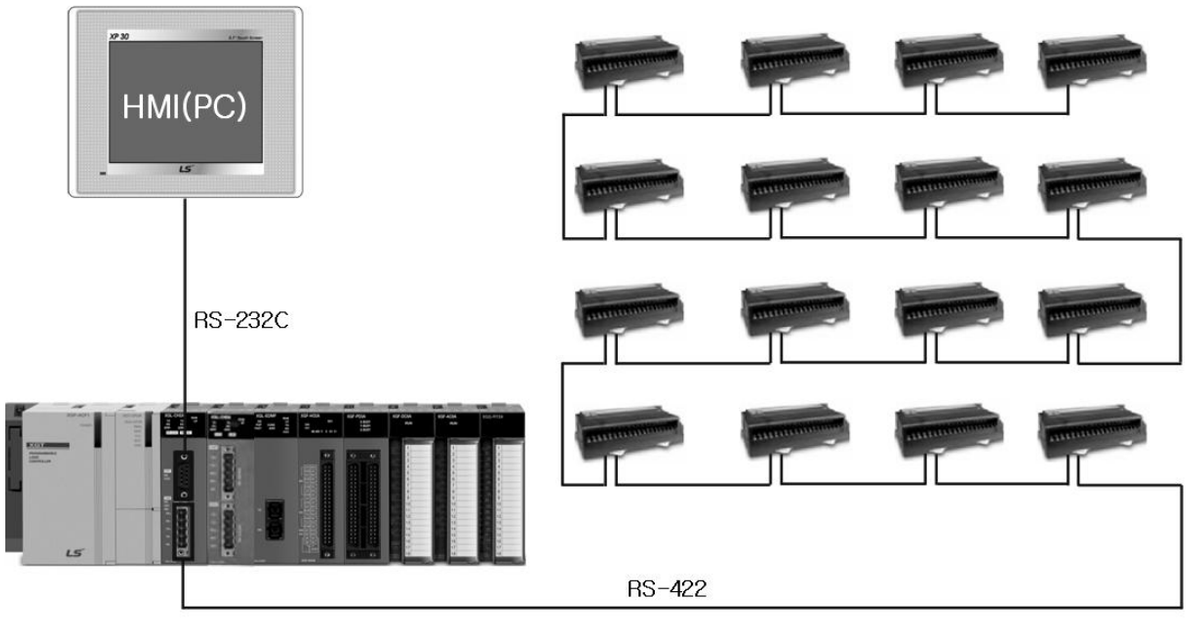
(1) Null-modem communication with PC (HMI) via RS-232C channel is available.

(2) PC (HMI) is operated as client station and Cnet I/F module RS-232C channel is operated as XGT server.

(3) Cnet I/F module RS-422 channel is operated in P2P mode.

(4) Display data is transmitted to display modules of mosaic panel via Cnet RS-422 channel.

(5) Display transmission data can be read in PC.



[Fig. 5.1.4] 7-Segment Operation system for RS-422

Type	Module setting		
	RS-232C	RS-422	Station No.
PLC Cnet #1 station	XGT Server	P2P	1

[Table 5.1.2] Module Setting Table for Station No

5.1.5 Optical modem communication for mobile communication

(1) Optical modem communication system for Cnet communication on body in lineal motion.

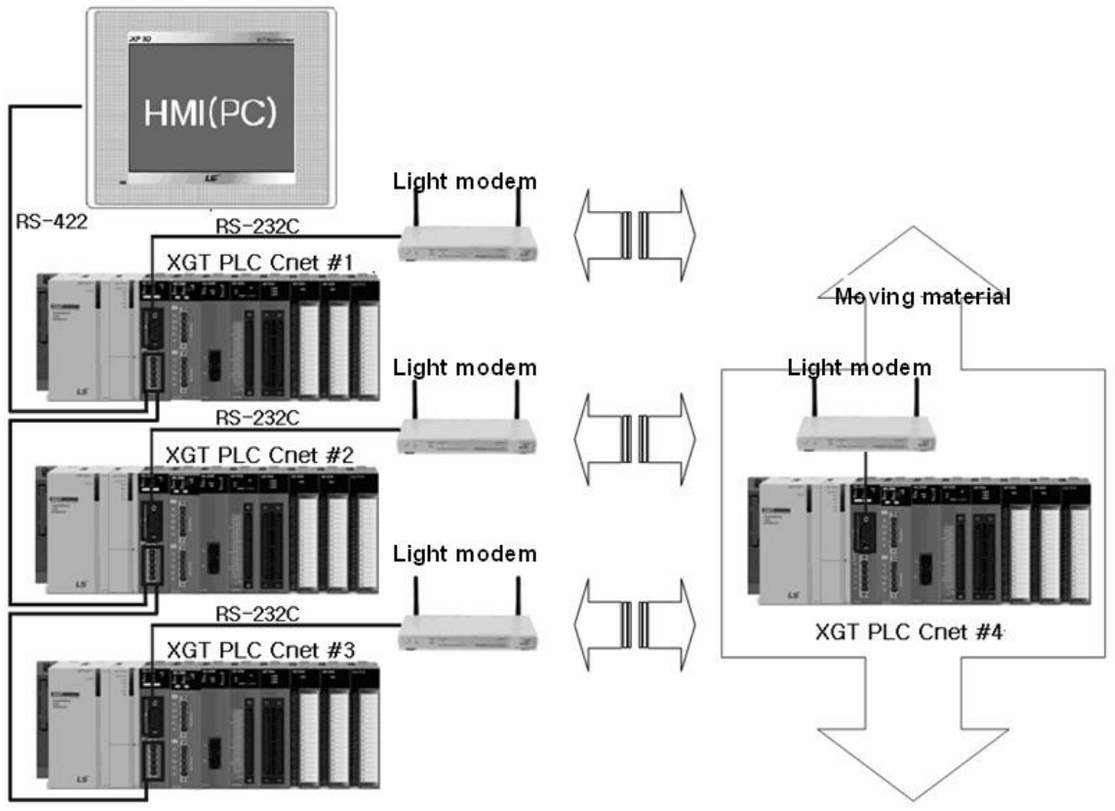
(2) Dedicated mode communication or P2P communication with monitoring device.

(3) RS -232C/RS-422 communication with optical modem.

(4) Dedicated client/sever communication between Cnet I/F modules.

(5) Optical modem connected with Cnet I/F module on mobile body can communicate with the other optical modem only when positioned in communication available

(6) Main application: Parking tower



[Fig. 5.1.5] Optical modem communication system

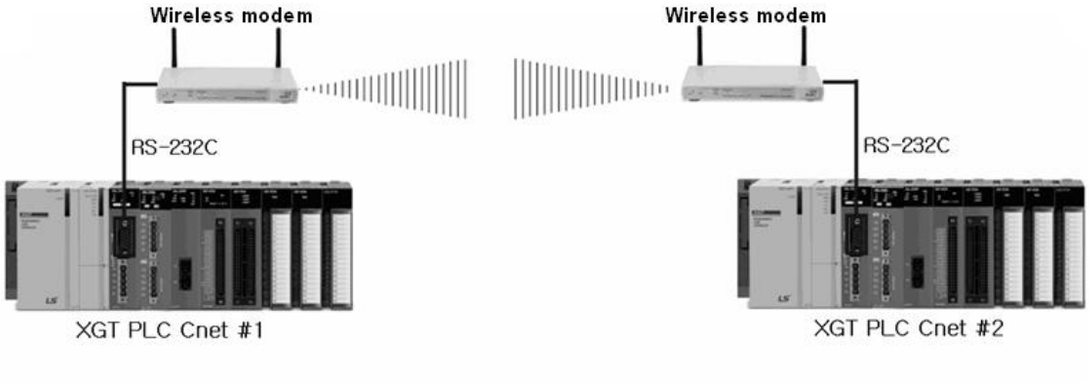
5.1.6 Wireless modem communication for communication between revolution bodies

(1) Wireless modem communication system for Cnet communication on body in revolution motion.

(2) RS-232C communication with wireless modem.

(3) Dedicated client/sever communication between Cnet I/F modules.

(4) RS-232C channel of Cnet I/F module is dedicated modem mode.



[Fig. 5.1.6] Wireless modem communication system

Type	Module setting		
	RS-232C	RS-422	Station No.
XGL-CH2A	Dedicated mode	Not used	1 & 2
	User mode		

[Table 5.1.3] Setting details between communication modules

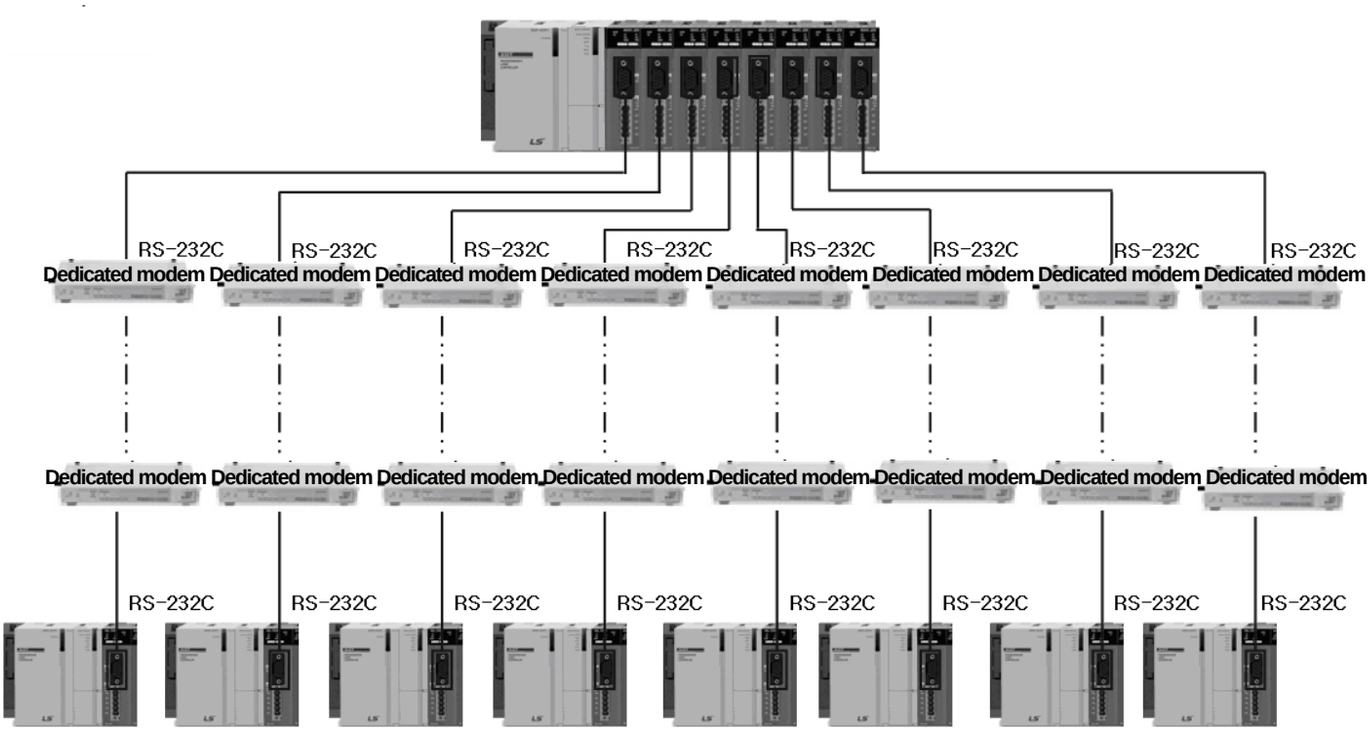
5.1.7 TM/TC communication system

(1) Long-distance communication with remote sever PLC via dedicated modem.

(2) Dedicated modem communication via RS-232C channel set to dedicated modem mode.

(3) Dedicated client/sever communication between Cnet I/F modules.

(4) 8 Cnet I/F modules can be mounted on TM client PLC.



[Fig. 5.1.7] TM/TC dedicated modem system

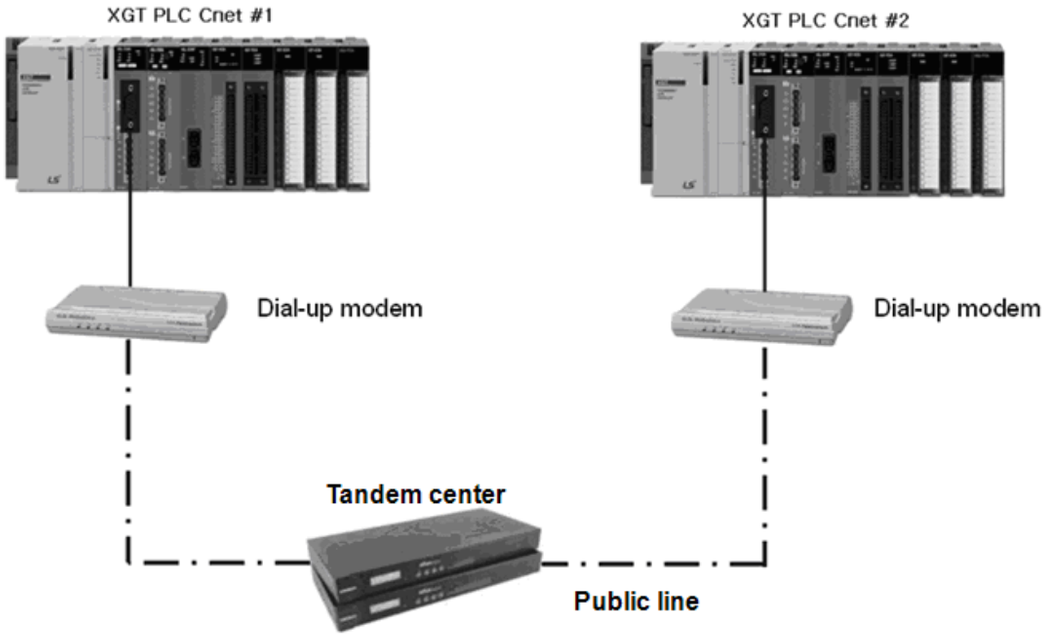
5.2 Unavailable System Configurations

5.2.1 Dial-up modem communication between Cnet I/F modules

(1) Cnet I/F module has no function to make telephone calls.

(2) Cnet I/F module has only function to answer telephone calls.

(3) Dial-up modem communication between Cnet I/F modules is unavailable.



[Fig. 5.2.1] Dial-up modem communication between Cnet I/F modules

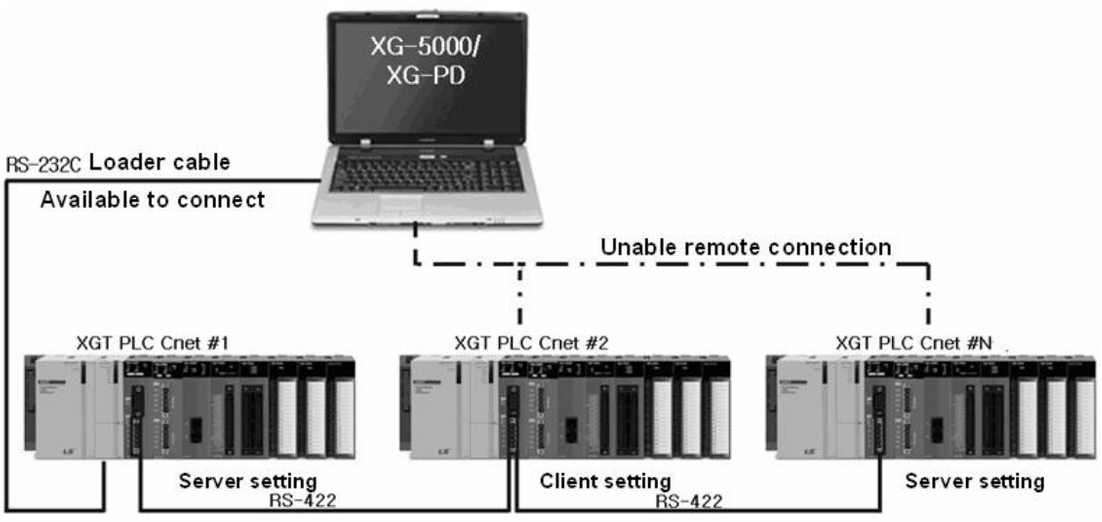
5.2.2 XG5000 connection using RS-422 channel of Cnet I/F module

(1) XG5000 service of Cnet I/F module supports only RS-232C channel.

(2) XG5000 connection via RS-422 channel is unavailable.

(3) Setting of Cnet's station number in XG5000 remote connection is unavailable.

(4) XG5000 connection is available only for Cnet #1 station as shown in [Fig. 5.2.2].



[Fig. 5.2.2] XG5000 connection via RS-422 channel

Chapter 6 Communication Parameter

6.1 General

Communication parameter is classified into basic setting parameter and P2P setting parameter.

6.1.1 Basic setting parameter

Here sets the media information, H/W information and basic protocol information.

Parameter	Lower menu	Setting item	Setting range	Contents
Basic setting	Connection setting	Communication type	RS-232C RS-422 RS-485	Interface setting
		Communication speed (bps)	300~115,200	Communication speed setting
		Data bit	7,8	Frame structure definition
		Stop bit	1,2	
		Parity bit	NONE,ODD,EVEN	
		Modem type	Null modem Dedicated modem Dial up modem	Setting related with modem
		Modem initialization	-	
		STATION NO.	0~31	Communication station no. setting
		Delay time	0~2550ms	Setting related with P2P
		Time out	0~5000ms	
	Operation mode	Use P2P	Select one	Communication method setting
		XGT server		
		Modbus ASCII server		
		Modbus RTU server		

Note

(1) Response waiting time: waiting time from sending to receiving
  (a) Operation setting: Settable in case operation mode is Use P2P.
  (b) basic response waiting time per communication speed
    1) 9,600~115,200bps : 100ms+(setting value×100ms)
    2) 7,200~2,400bps : 200ms+(setting value×100ms)
    3) 1,800~1,200bps : 400ms+(setting value×100ms)
    4) 600bps : 800ms+(setting value×100ms)
    5) 300bps : 1,200ms+(setting value×100ms)
(2) Delay time setting: sends frame after delay time set by user
  (a) Operation setting: settable in case communication type is RS-422/485
(3) Delay time between character: In case of character coming within set time at one frame, it means character interval between character
  (a) Operation setting: settable regardless of operation mode

(1) P2P service

(a) The Cnet I/F module operates as a client in the network.

(b) When the designated event occurs, it is available to read or write the meory.
(It can operate as XGT client and modbus client.)

(c) It is used to communicate with other device that doesn't support the XGT or modbus protocol or send/receive the user definition frame.

(d) It is available to define max. 64 P2P blocks per each channel.

(2) Dedicated service (XGT server, modbus ASCII server, modbus RTU server)

(a) It is available to write/read the information without specific program.

(b) It can operate as XGT server that supports the XGT protocol and modbus server that supports the RTU/ASCII protocol.

6.1.2 P2P setting parameter

This sets the communication frame.

Parameter	Lower menu	Setting item	Setting range		Contents
P2P	Communication module setting	Base	0~7		Set the location of module
		Slot	0~11		
	P2P channel	P2P driver	User frame definition		Communication method setting
			XGT client		
			Modbus ASCII Client		
			Modbus RTU Client		
	P2P block	Channel	1, 2		Communication port setting
		P2P function	READ		Data Tx/Rx setting (SEND, RECEIVE is used in the user definition frame.)
			WRITE		
			SEND		
			RECEIVE		
		Conditional flag	-		Sets the operation condition of frame (Conditional flag can be set when P2P function is SEND in case of user definition frame.)
		Command type	Single		Sets the sending method
			Continuous		
		Data type	BIT		Sets the data unit of frame
			WORD		
			1 BYTE		
			2 BYTE		
			4 BYTE		
			8 BYTE		
		No. of variable	-		Sets the no. of variable in the frame
		Data size			Sets the data size in the frame
		Destination station			When destination station is necessary.
		Destination station no.			Sets the destination station no.
		Frame			Sets the body name in case of user definition frame communication
		Setting			In case of user definition frame communication, Setting item can be set when variable sized variable or fix sized variable is selected in the frame body.
	User definition frame	Add group	Group name		Sets the frame group name
			Frame type	Transmission	Sets the frame related with transmission
				Reception	Sets the frame related with reception
	Frame	Edit group	Group name		Frame setting is available after setting the group name and frame type.
		Delete group			
		Add frame	HEAD		
			TAIL		
			BODY		

6.2 Transmission Standard

In order to use the Cnet I/F module, set the transmission standard like baud rate, data/stop bit. The basic setting item of Cnet I/F module should be same with transmission standard of system. The written contents are saved in the CPU module of PLC, those are kept regardless of power supply unit the user write new one.

6.2.1 Setting item

Setting item of Cnet is shown in [Table 6.2.1].

Item		Setting value		Default	Reference
Communication type		RS-232C / RS-422 / RS-485		RS-232C	Setting is essential
Baud rate (bps)		300/600/1,200/1,800/2,400/3,600/4,800/7,200 /9,600/19,200/38,400/57,600/64,000/115,200		9,600	
Data type	Data bit	7/8		8	
	Stop bit	1/2		1	
	Parity bit	None/Even/Odd		None	Check specific information
Modem type		Null modem / dedicated modem / dial up modem		Null modem	
Dedicated service driver		XGT dedicated	XGT server	XGT server (XGT dedicated communication)	Check specific information
		Modbus	RTU/ASCII server		
			Bit read/write area Word read/write area		
Station number		0 ~ 31		0	Commonly used to all services

[Table 6.2.1] Cnet basic setting item

Since the Cnet I/F module provides two communication channels, Cnet basic setting is necessary for each cannel. According to communication module, RS-232C 2 ports, RS-232C 1port/RS-422 1 port, RS-422 2 ports is provided.

Additional information of some items in [Table 6.2.1] is as follows.

(1) Communication type

Check the Cnet I/F module and set the parameter about each channel accurately. If communication type set by parameter is different with channel type of real communication module, normal communication is impossible because CPU recognizes the channel type of real communication module.

(a) Parity bit

The Cnet I/F module defines three parity bit. Each parity bit has the following meaning like [Table 6.2.2].

Parity	Meaning	reference
None	Not use parity bit	
Even	If the number of 1 is even in the one byte, it sends 0 at the parity bit.	
Odd	If the number of 1 is odd in the one byte, it sends 0 at the parity bit.	

[Table 6.2.2] Parity content

(b) Dedicated service driver

The user can select the operation mode about each channel of Cnet I/F module by using the driver selection item.
Each channel of Cnet I/F module operates as server or client, each channel operates independently.

Type and meaning of operation mode for each channel is as following [Table 6.2.3].

Driver type	Meaning	Reference
P2P	Relevant port acts as client and it communicates by P2P parameter setting.	Refer to P2P setting
XGT server	Supports the XGT dedicated communication and acts as XGT server.	For dedicated service
Modbus ASCII server	Acts as modbus ASCII server	
Modus RTU server	Acts as modbus RTU server	

[Table 6.2.3] Driver type and meaning

If operation mode of Cnet channel is XGT server or modbus, it supports the loader service with the dedicated service.

1) XGT server
Supports reading/writing memory of the dedicated service

2) Modbus ASCII/RTU server
a) This is used when network is configured with modbus protocol and Cnet I/F module acts as server.
b) Since modbus memory area is different with XGT memory area, memory mapping is necessary.
c) For memory mapping, refer to the “Chapter 7.1”

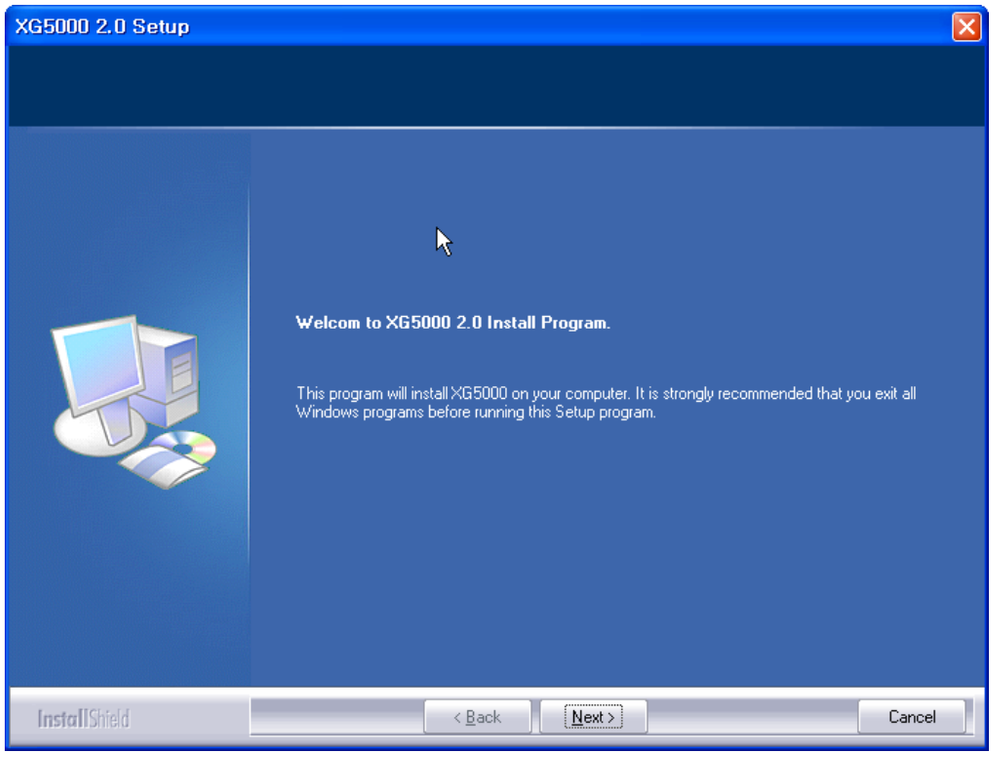
6.3 Installation and Execution of Software

To use the XG-PD software, the user should install the XG5000.
System requirement for execution is as follows.

(1) PC and memory
More than Pentium CPU and 128MB memory
(2) Communication port
RS-232C serial port and USB port is necessary.
(3) Hard disk
More than 100MB
(4) Mouse
Mouse connect-able with computer
(5) Monitor
Resolution is more than 1,024 X 768
(6) Window
Operates in the window 2000/XP. In the window 98/ME, due to the limit of memory, if the user executes many applications including the XG5000, XG5000 may be down. Use the XG5000 in the window 2000 or XP environment.

6.3.1 XG5000 installation

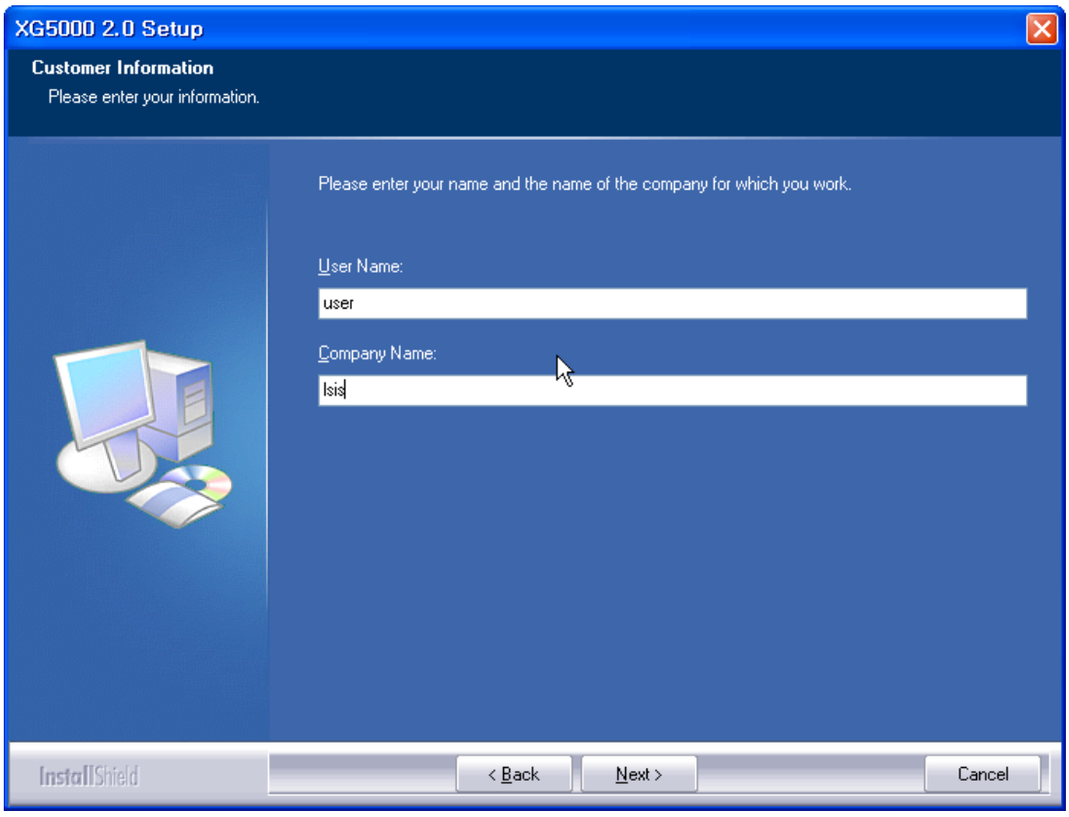
(1) Execute the installation file.
(2) Installation wizard prepares the installation like the followings.


XG5000 2.0 Setup
Welcom to XG5000 2.0 Install Program.
This program will install XG5000 on your computer. It is strongly recommended that you exit all Windows programs before running this Setup program.
InstallShield
< Back
Next >
Cancel

(3) Click the 'Next' button. The contract is shown.

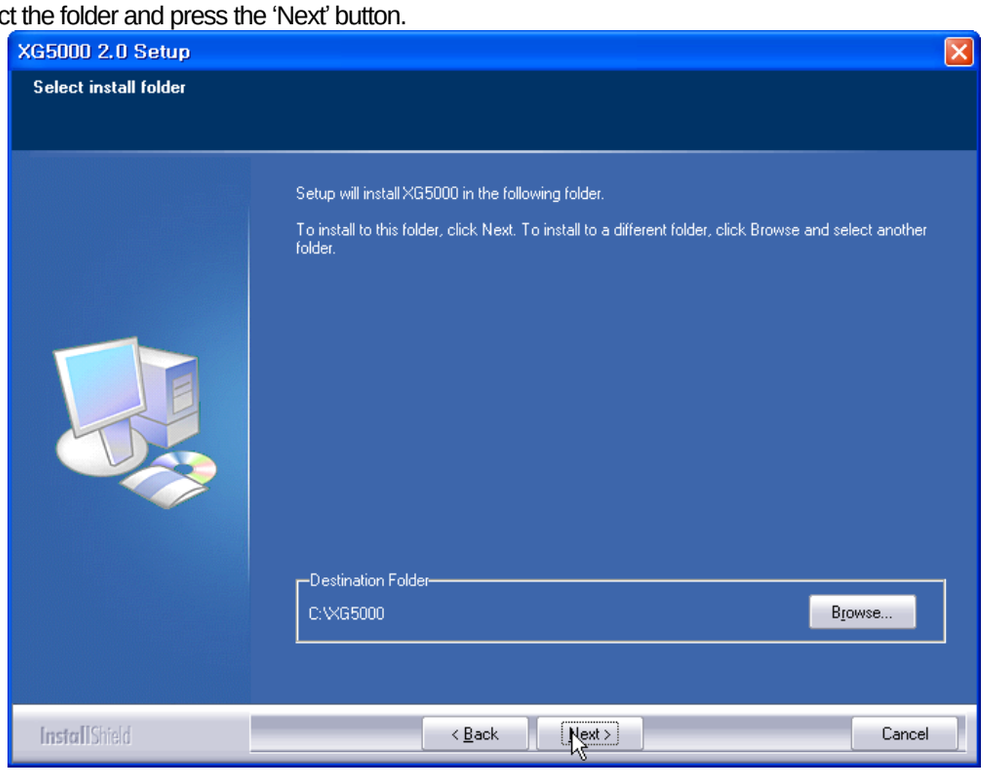
(4) Read carefully and press the 'yes' button.

(5) Input the name and company name.

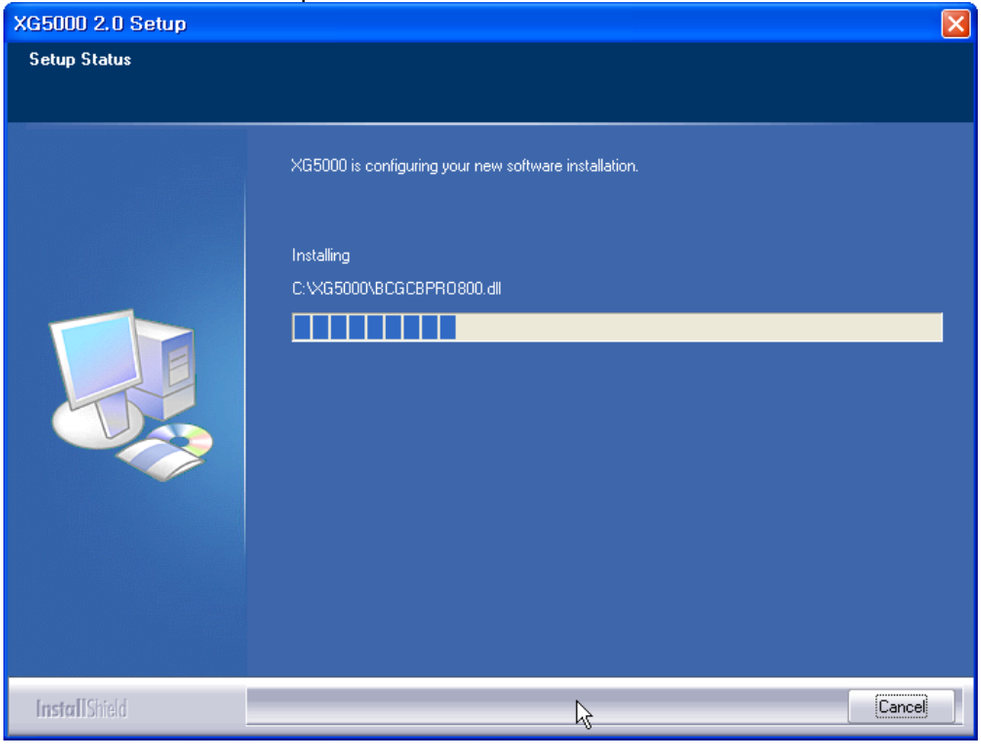


(6) Designates the folder to install the XG5000. If the user wants to change the folder, press the 'search' button and input or select the new folder. The XG5000 needs the 30MB to install. If installation area is not enough, you can't install the XG5000.

(7) Select the folder and press the 'Next' button.

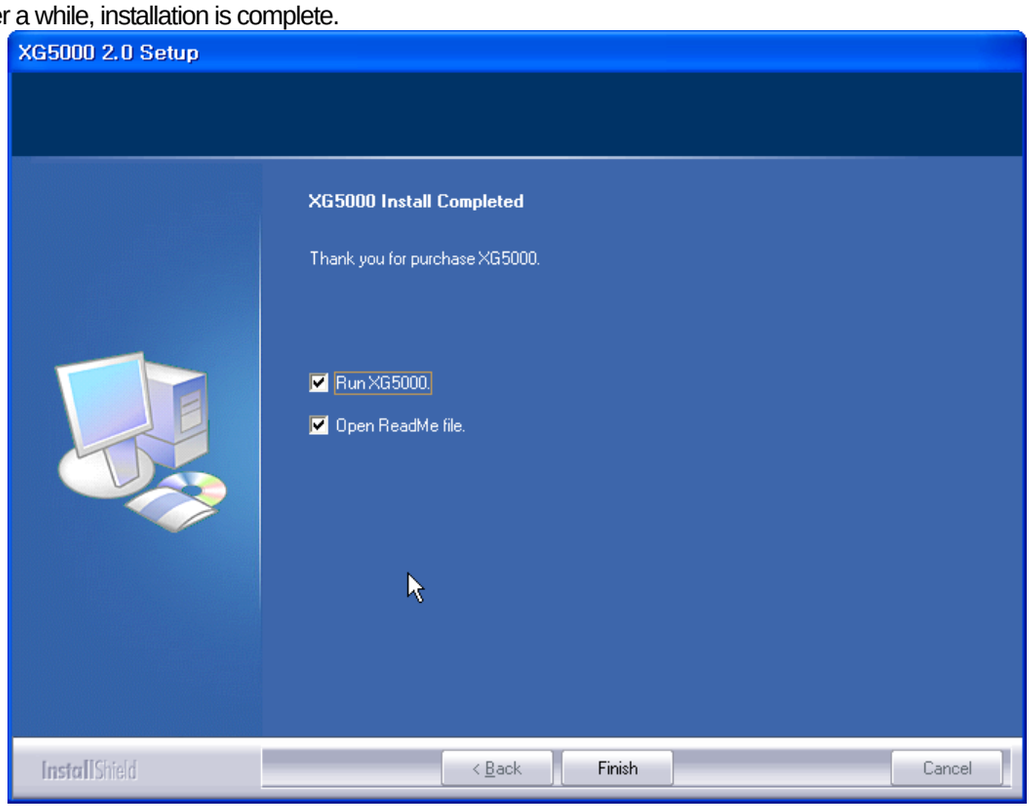

XG5000 2.0 Setup
Select install folder
Setup will install XG5000 in the following folder.
To install to this folder, click Next. To install to a different folder, click Browse and select another folder.
Destination Folder
C:\XG5000
Browse...
InstallShield
< Back
Next >
Cancel

(8) Check the installation location and press the 'Next' button.



(9) Among installation, XG5000 USB driver installation screen shows.

(10) After a while, installation is complete.

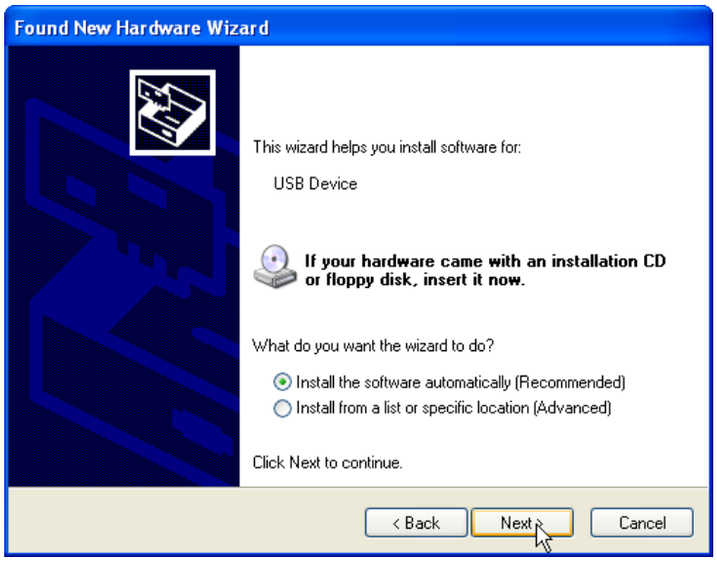


6.3.2 USB device driver installation

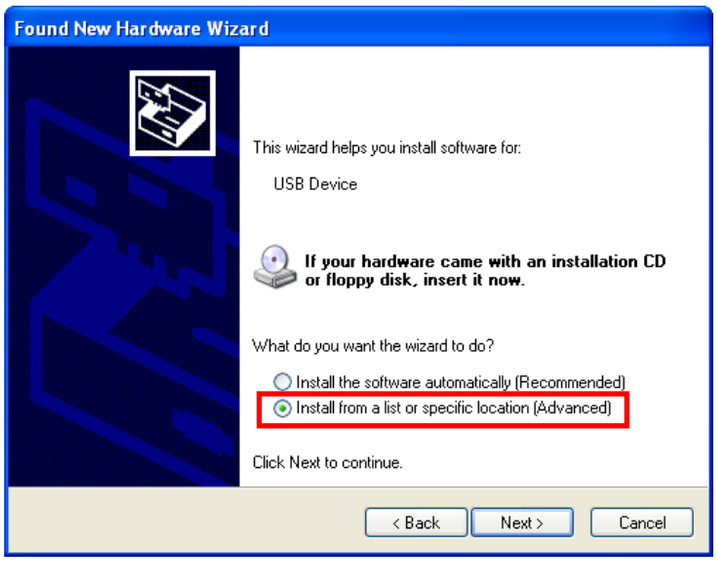
In case of installing the XG5000 first time, the user should install the USB device driver additionally. In case of not connecting with USB, install the USE device driver like below.
In the window 2000, when installing the XG5000, USB device driver is installed automatically. But in the window XP, the user should install it additionally.

(1) Check if there is the Drivers folder in the XG5000 folder. There are two files, GmUSBD.sys, GmUSBD.inf. If there is no folder or driver file, reinstall the XG5000.

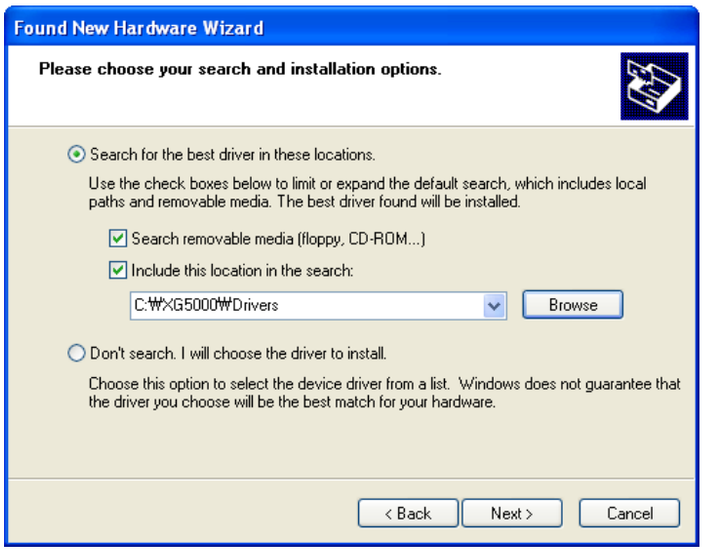
(2) Turn the PLC power on and connect the USB connector to PC. If it is done, 'Found new hardware wizard' shows and notify the installation of the device driver.


Found New Hardware Wizard
This wizard helps you install software for:
USB Device
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

(3) Select 'Install from a list or specific location (Advanced)'.


Found New Hardware Wizard
This wizard helps you install software for:
USB Device
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

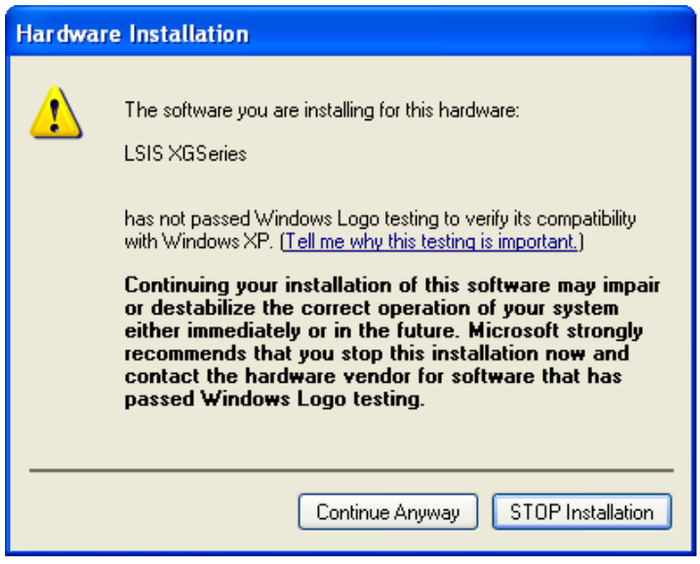
(4) Among driver searching options, select “Search for the best driver in these locations” and check “Include this location in the search”.


Found New Hardware Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
C:₩XG5000₩Drivers
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

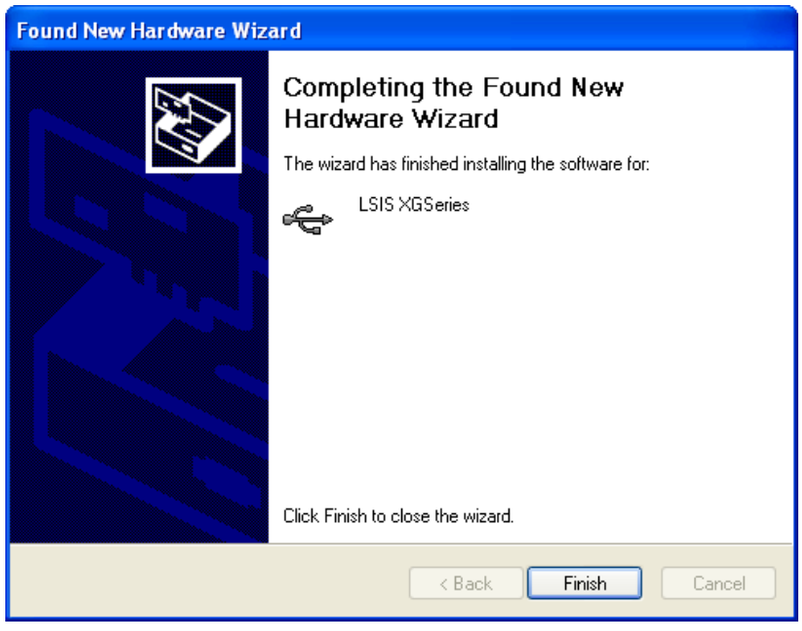
(5) Click [Browse] button. On Browse Folder Dialog Box, select Drivers’ folder where XG5000 is installed.

(6) Click [OK] button. Then, a computer starts searching for the driver files in the selected folder.

(7) If the computer found the most suitable device driver, you will be asked to decide to install the selected device driver. Since USB device driver operated stably based on Windows OS, you may click [Continue Anyway] button


Hardware Installation
The software you are installing for this hardware:
LSIS XGSeries
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

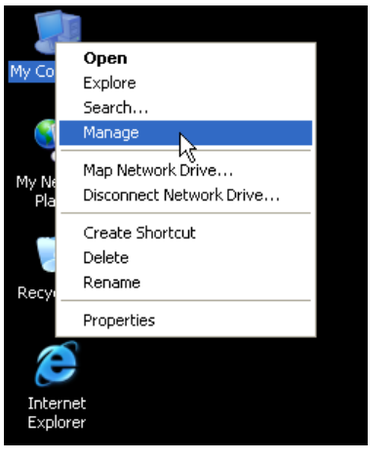
(8) If the device driver has been installed completely, the Installation Complete Dialog Box will be displayed as follows. Click [Finish] button to end the installation of the driver.



6.3.3 Confirmation of installed USB device driver

If USB connection is not available, check the installation status of the device driver as follows

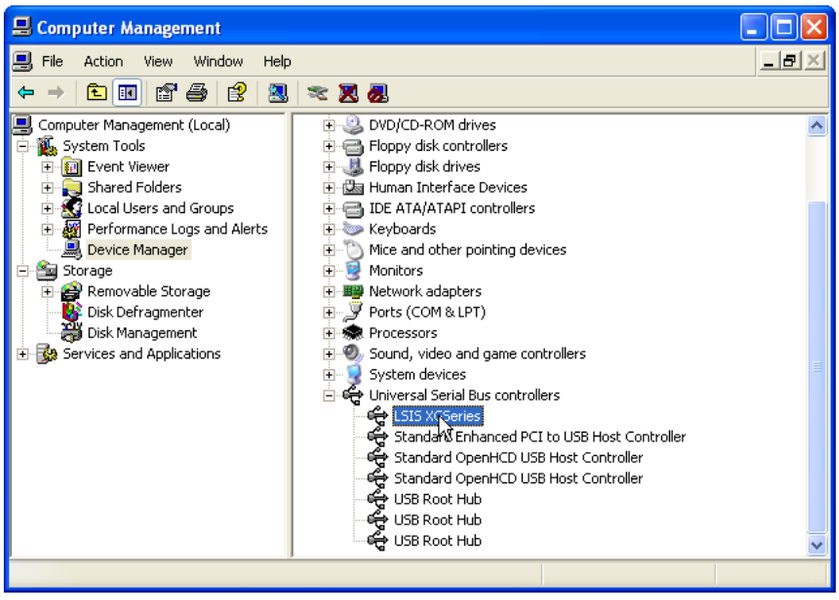
(1) Click the right button of the mouse with the cursor on [My Computer] icon on the background screen, and select [Manage] on the menu



(2) Computer Management Dialog Box will be displayed as shown in the figure below. On the left tree list of Dialog Box, click [Computer Management (Local)]-[System Tools]-[Device Manager] in regular order. The items displayed on the right list may be different according to devices installed on the computer.

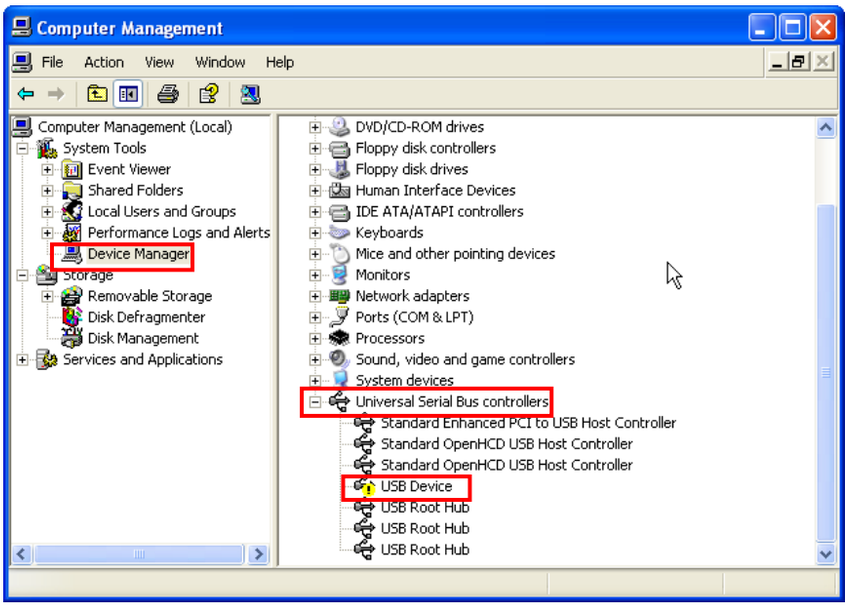
(a) Normal Case

The USB device driver for XGT PLC has been installed successfully, if the list [LSIS XG Series] appears with the figure under [Universal Serial Bus Controller].



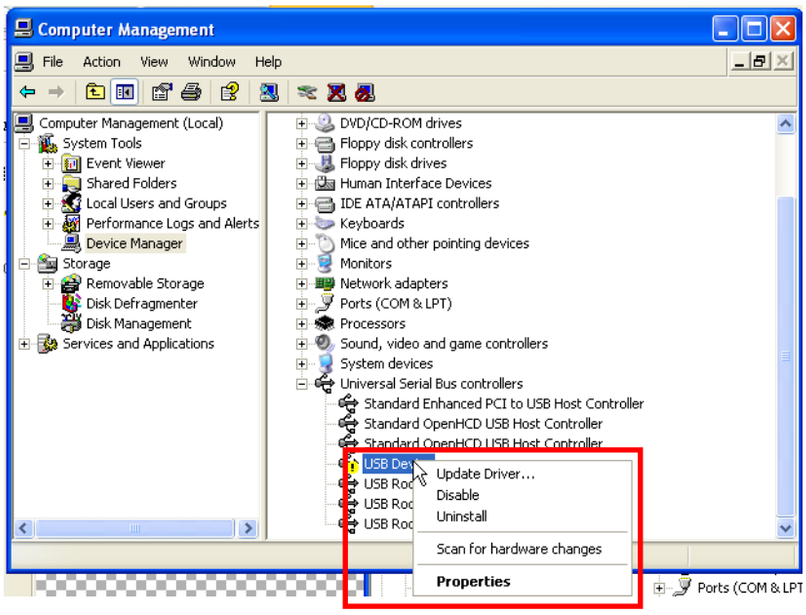
(b) Abnormal Case

The device driver has not been installed successfully, if the following figure is displayed.

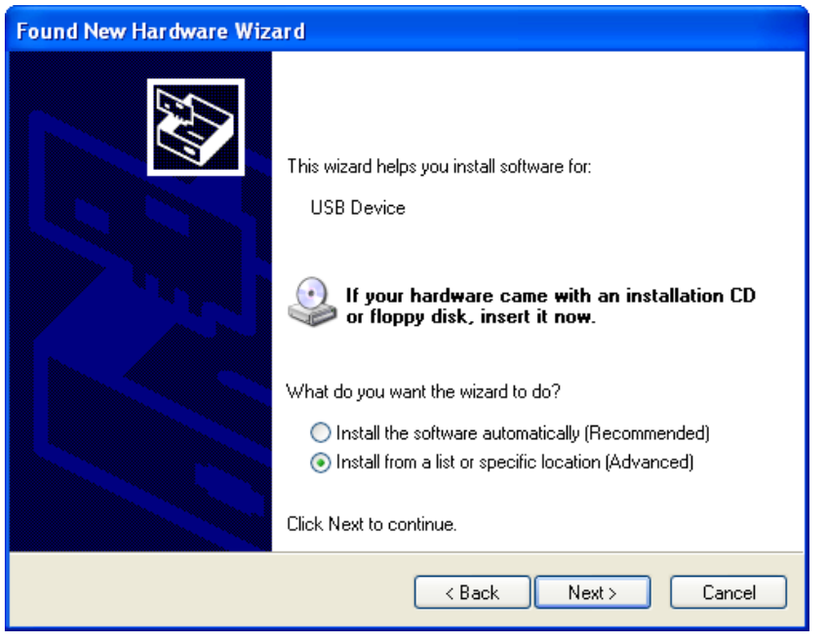


If the USB driver for XGT PLC is not installed successfully, reinstall the USB driver for XGT PLC in the following steps.

(1) On the device driver with the icon with an exclamation mark, click the right button of the mouse. Select [Update Driver] on the menu.

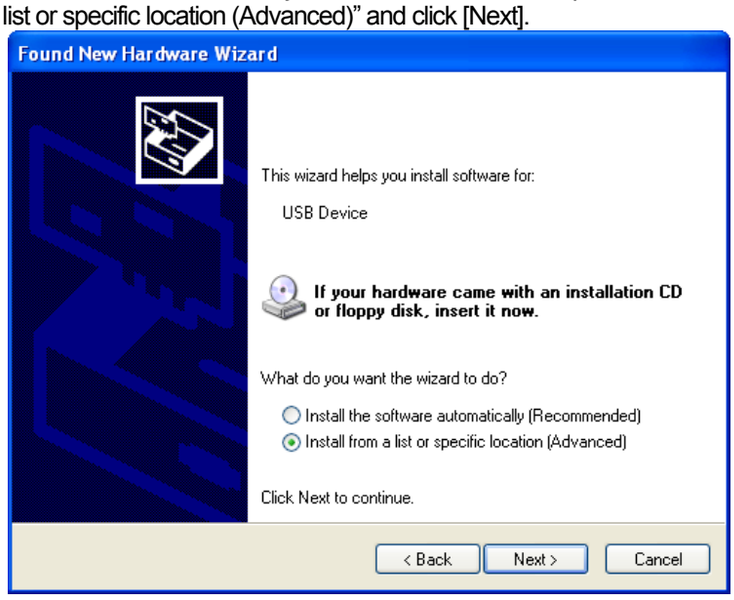


(2) H/W Update Wizard Dialog Box will appear. Select the option “Installation from a list or specific location (Advanced)” and click [Next]. The next sequence is manually the same as in Installation of Device Driver.

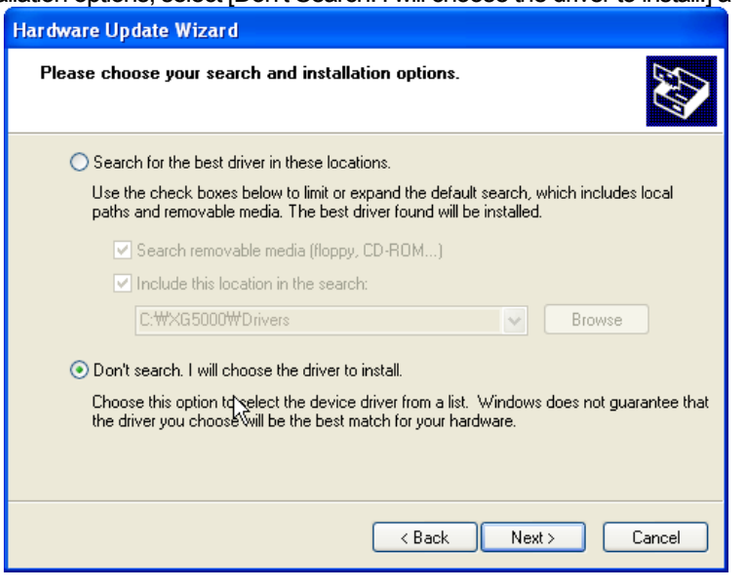

Found New Hardware Wizard
This wizard helps you install software for:
USB Device
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

If the USB driver for XGT PLC is not installed successfully, reinstall the USB driver for XGT PLC in the following steps

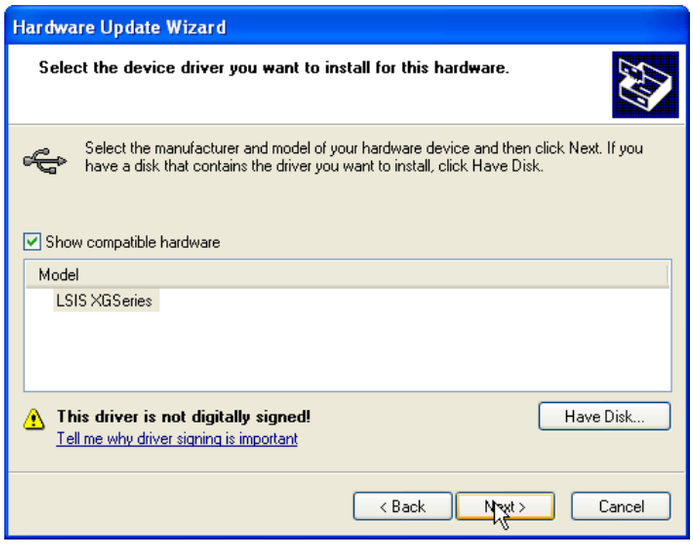
(1) If the device driver has been installed incorrectly or in error, execute H/W Update Wizard. Select the option "Installation from a list or specific location (Advanced)" and click [Next].


Found New Hardware Wizard
This wizard helps you install software for:
USB Device
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

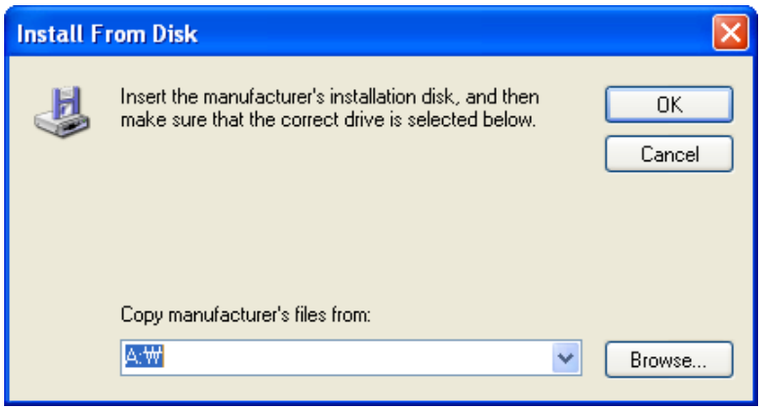
(2) On search and installation options, select [Don't Search. I will choose the driver to install.] and click [Next]


Hardware Update Wizard
Please choose your search and installation options.
Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM...)
Include this location in the search:
C:₩XG5000₩Drivers
Browse
Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back
Next >
Cancel

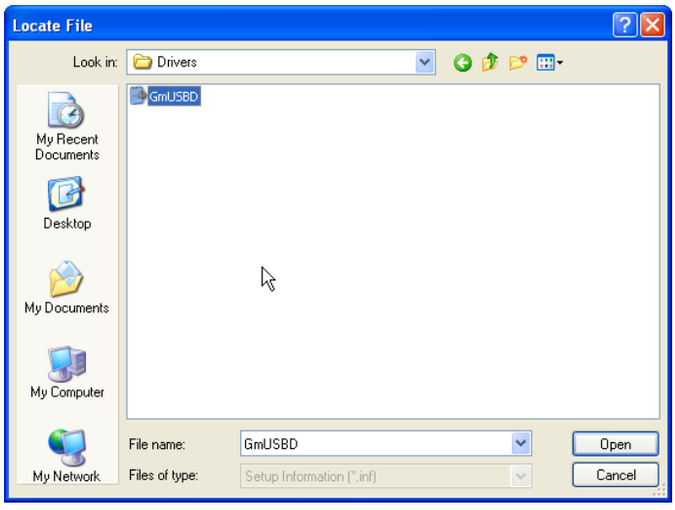
(3) Click [Have Disk…] on the Dialog Box below


Hardware Update Wizard
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Show compatible hardware
Model
LSIS XGSeries
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
< Back
Next >
Cancel

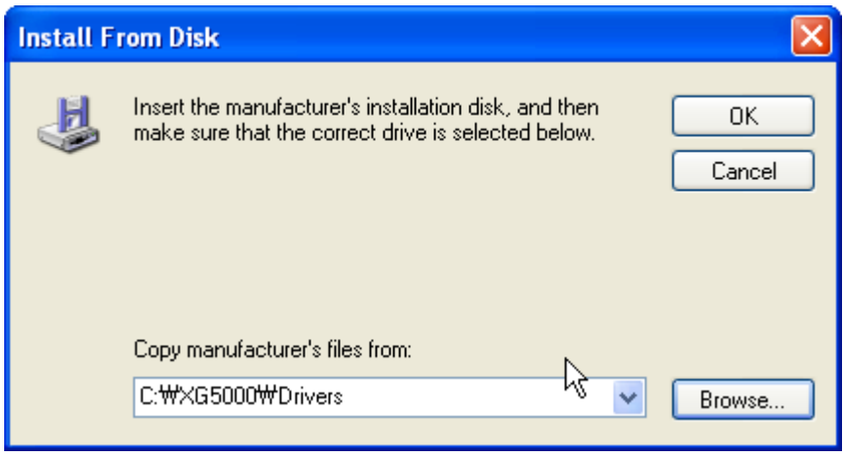
(4) If Installation Dialog Box is displayed on the disk, click [Browse] button.



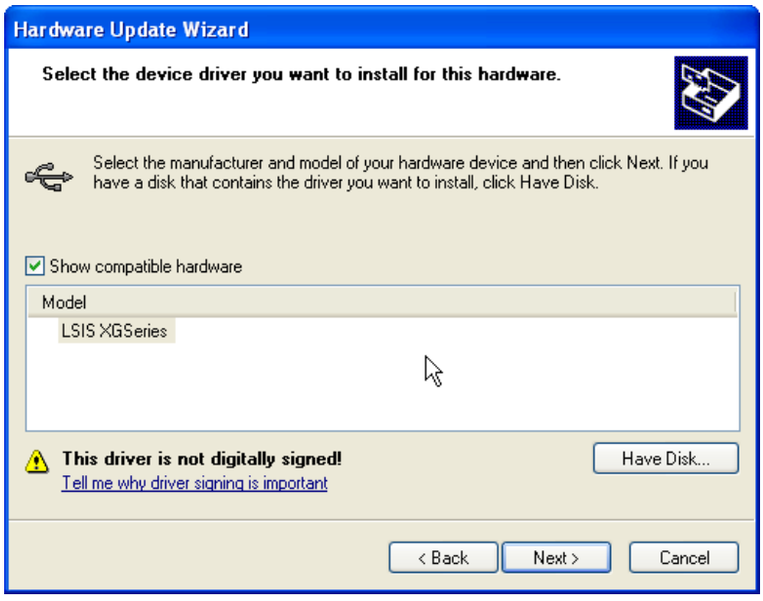
(5) From the Browse File Dialog Box, move to the folder XG5000 is installed in. Select drivers folder to display GmUSBD.inf file. With this file selected, click [Open] button.



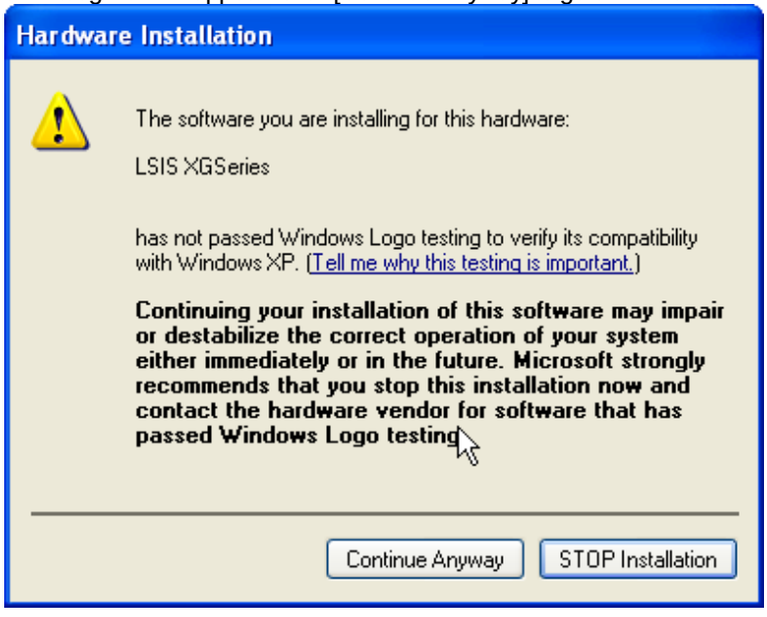
(6) On the item of 'Copy manufacturer's files from', a directory with the file of the device driver will be displayed. Click [OK] button



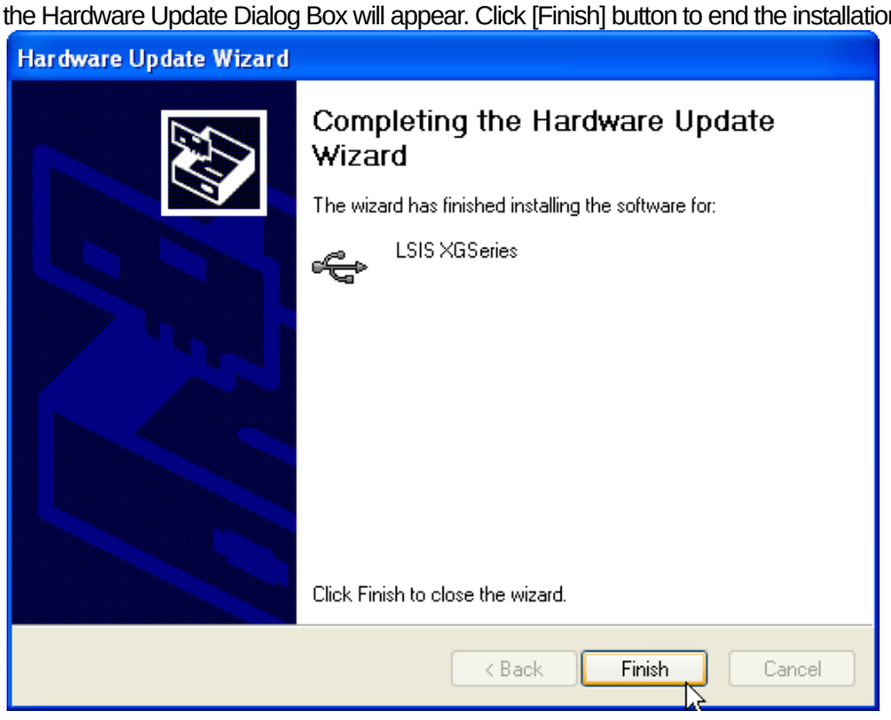
(7) On 'Show compatible hardware' list of the device driver Select Dialog Box, select "LSIS XGSeries" driver and then click [Next] button


Hardware Update Wizard
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Show compatible hardware
Model
LSIS XGSeries
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
< Back
Next >
Cancel

(8) Hardware Installation Dialog Box will appear. Click [Continue Anyway] to go on with the installation


Hardware Installation
The software you are installing for this hardware:
LSIS XGSeries
has not passed Windows Logo testing to verify its compatibility with Windows XP. (Tell me why this testing is important.)
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the hardware vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

(9) Completing the Hardware Update Dialog Box will appear. Click [Finish] button to end the installation of the driver



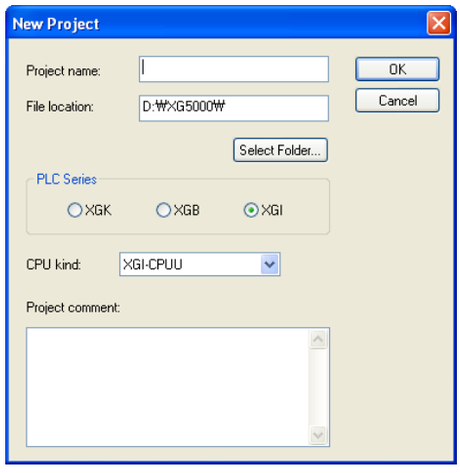
6.4 Communication Module Registration

In order to use Cnet I/F module, communication parameters shall be specified in XG-PD. And for system setting of Cnet I/F module positioned at an optional place, its applicable module shall be registered in XG-PD. How to register the optionally positioned Cnet I/F module depends on On/Off line status as described below.

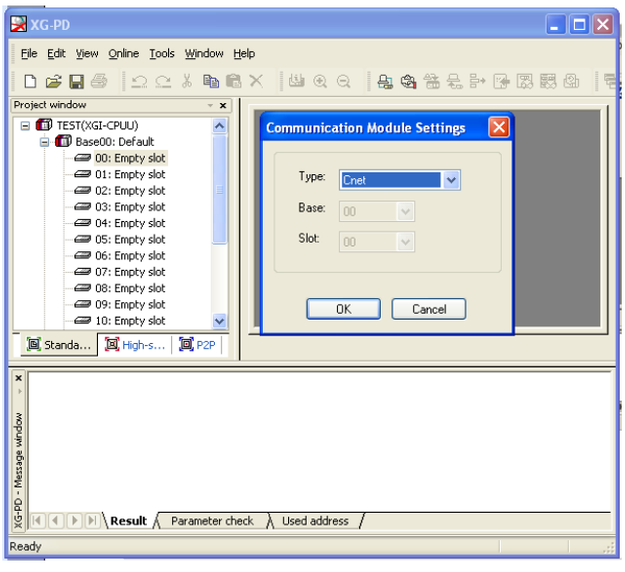
6.4.1 Off-line registration of Cnet I/F module

This method is used when the user writes the parameter related with communication about communication module that is not connected with PLC.

(1) Execute the XG-PD and select [File]-[New File] or click the icon ( ).



(2) Input the project name, file location and PLC type the user is using.

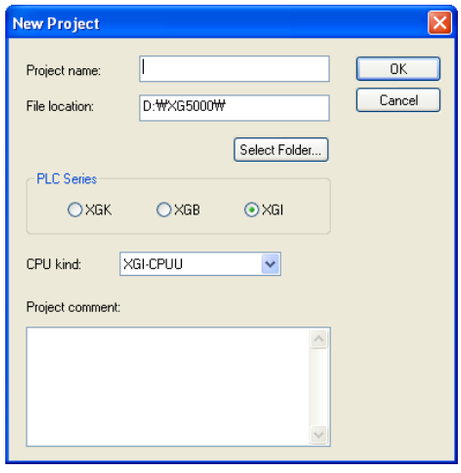


(3) In the 'Standard settings', double-click the location of base and slot where the Cnet I/F module is mounted and activate the 'Communication Module Setting' window.

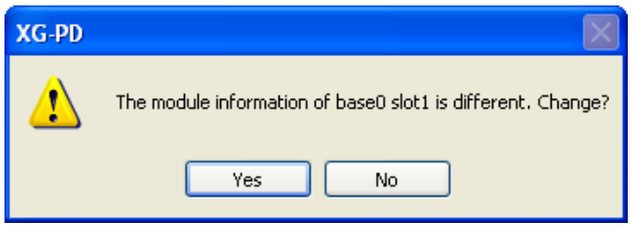
6.4.2 Online registration of Cnet I/F module

Step (1), (2) of off-line registration is same and the next step is as follows.

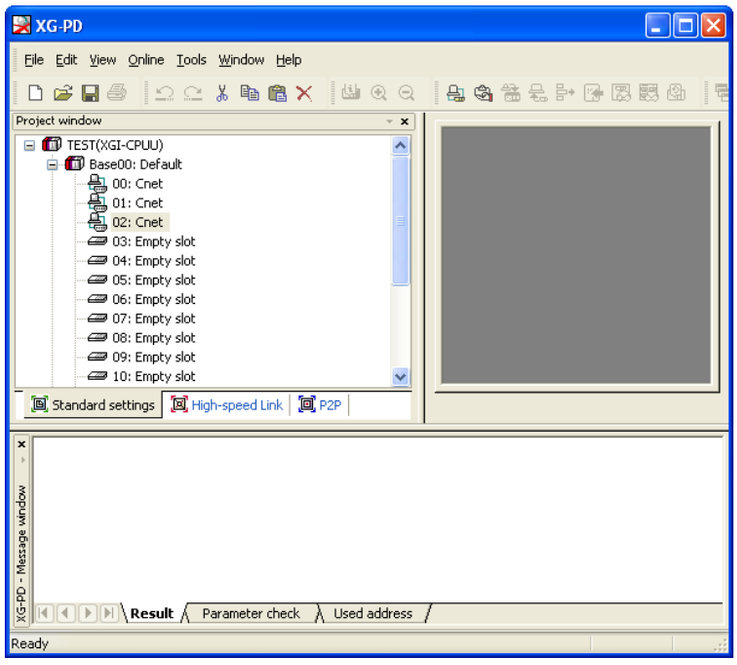
(1) Input the project name, file location and PLC type the user is using.
(2) If connection fails, check the connection status. Select [Online] – [Connection settings] or click the icon ( ). There are many connection types (RS-232C, USB, Ethernet and modem) and depths (Local, Remote 1, Remote 2). For remote connection, refer to the 7.3.



(3) If connection succeeds, lower menu of online is activated.
(4) In order to check the currently mounted modules, select [Online] – [Read IO Information] or click the icon ( ). Then all currently mounted communication modules in the basic and extension bases are searched and shown in the Project window.
(5) If previous information of mounted module is different with currently mounted PLC information, the following message shows to check.



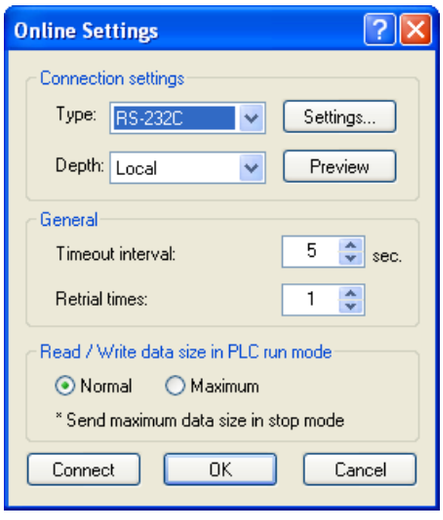
(6) The list of the mounted communication module shows in the Project window.



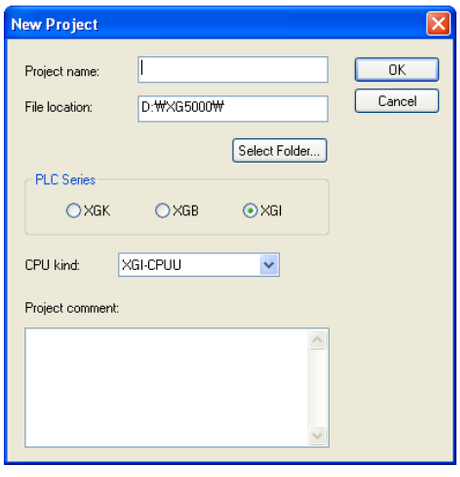
6.4.3 How to read the parameter saved in the PLC

To read the parameter saved in the PLC, follow the below sequence.

(1) Select the 'Open from PLC'.

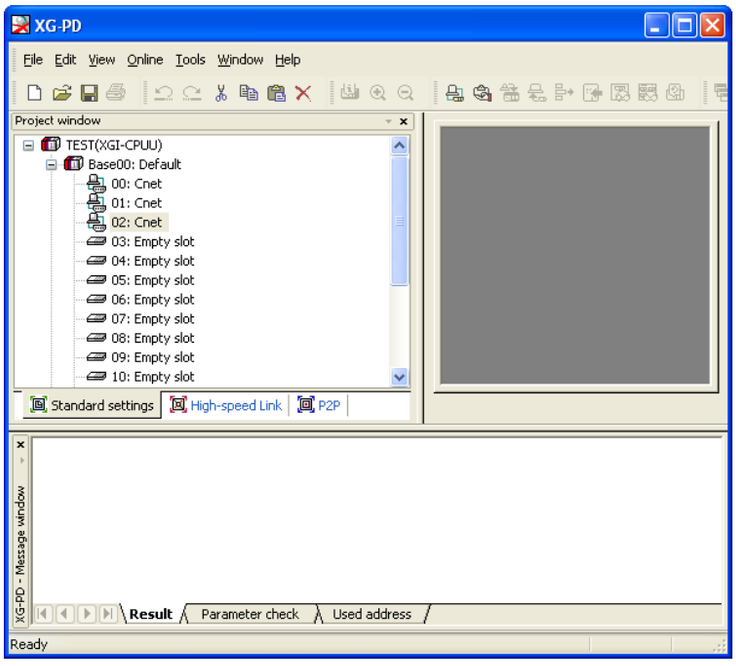


(2) After setting the connection type and depth, click the connection.



(3) Input the project name and file location and click the OK.

(4) The user can check the setting value of standard settings and P2P saved in the PLC.



6.5 How to set the Transmission Standard

6.5.1 How to set

To operate the Cnet I/F module according to communication standard and mode defined by the user, follow the lower steps. For example, the following example sets the XGL-CH2A (RS232 1 port, RS422 1port) equipped at the base 0, slot 2 according the lower standard.

(1) Communication standard

(a) Channel 1: RS-232C, 9,600 Bps, 8/1/None, Null modem, XGT server, self station number 1

(b) Channel 2: RS-422, 38,400 Bps, 8/1/Odd, Null modem, Use P2P, self station number 2

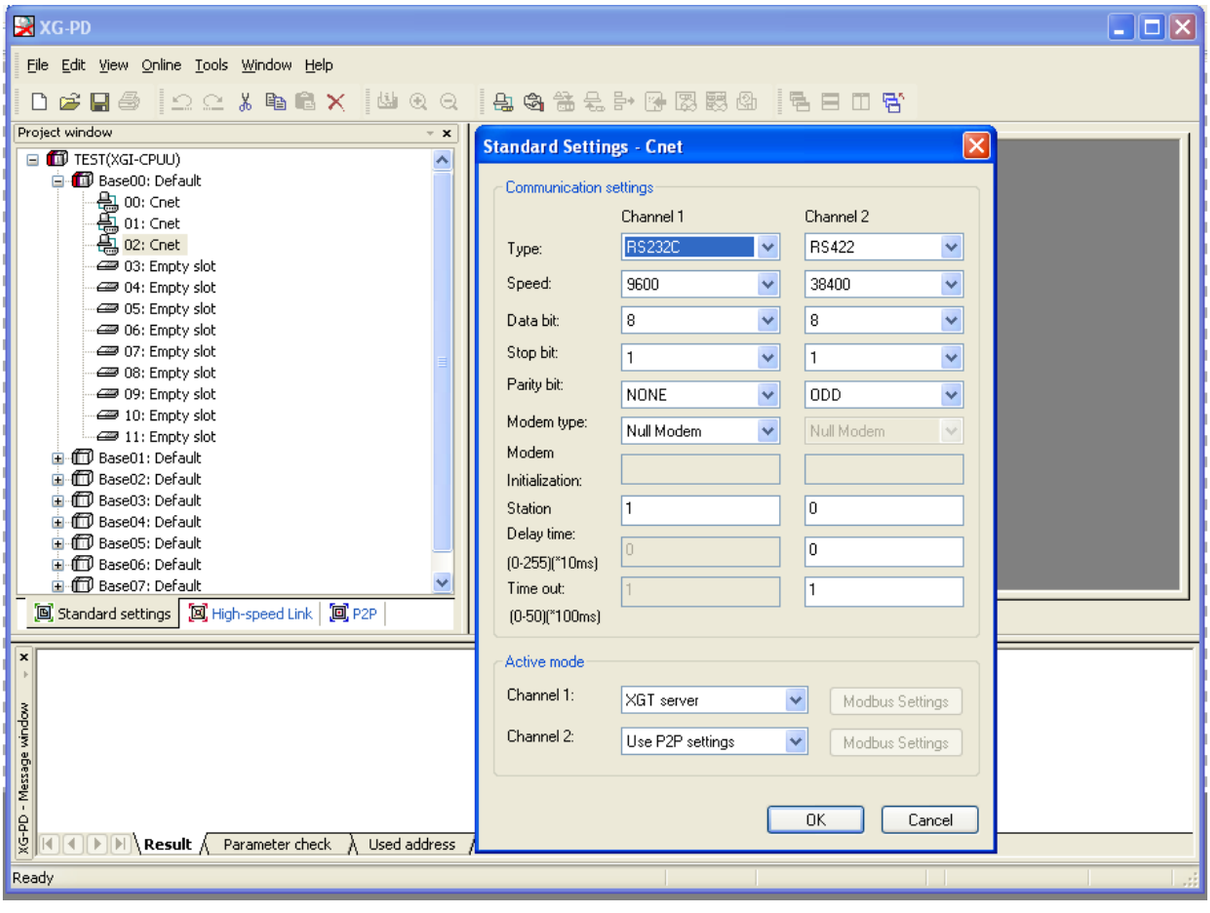
(2) Execution sequence

(a) Read I/O Information

Read the IO information of the currently mounted modules by [Online]-[Read IO Information] after connection.

(b) Standard settings

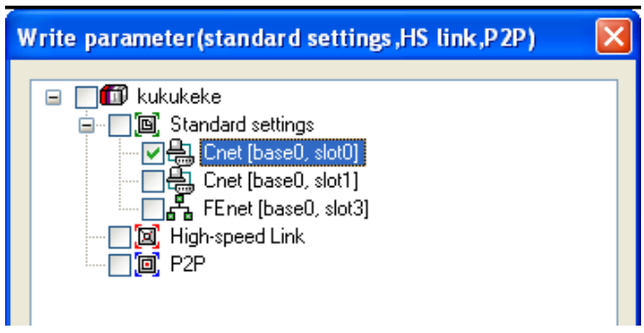
If the user double-clicks the Cnet I/F module mounted at the no. 2, standard settings shows. Write the items like the lower figure.



(c) Writing the parameter

1) Select [Online]-[Write Parameter] or click the icon ( ).

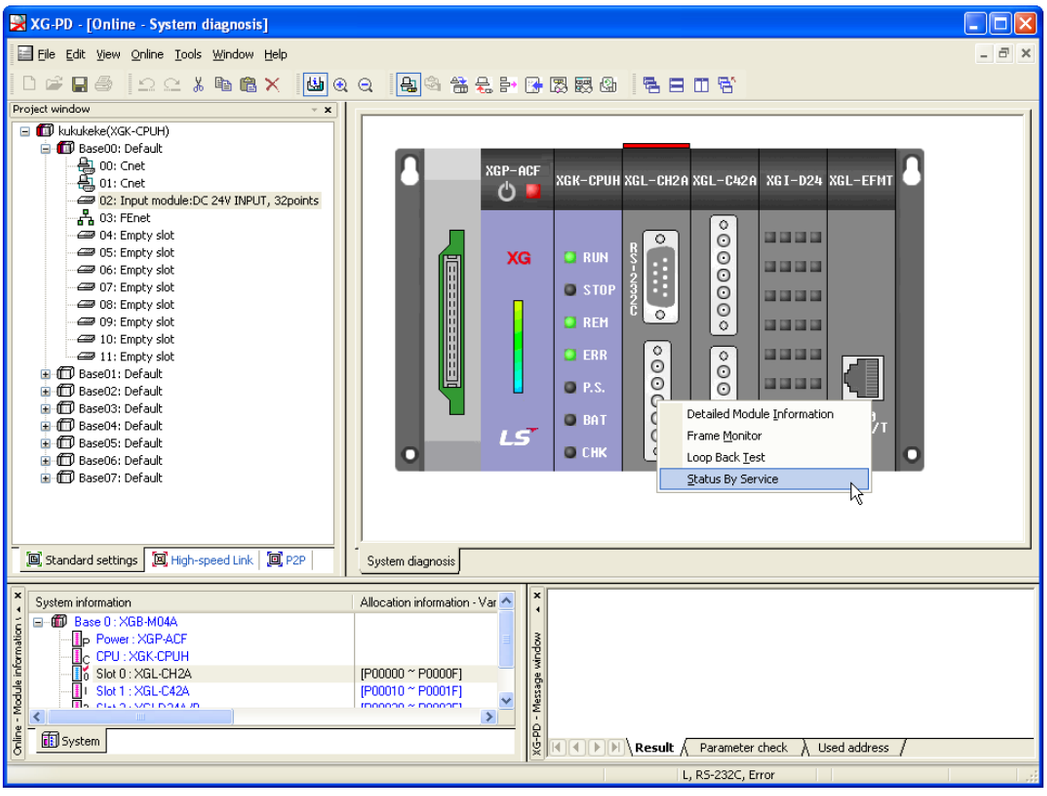
2) Check the setting module and click the 'OK'.



(d) Checking the operation

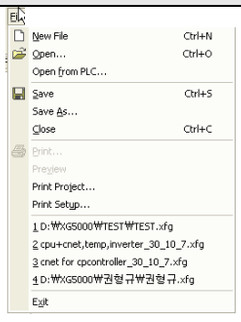
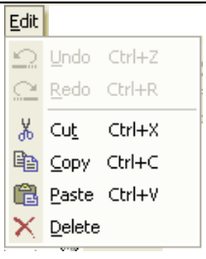
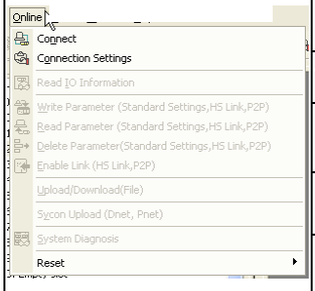
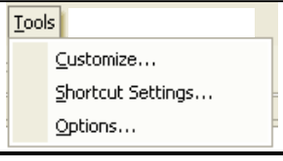
1) Select [Oline]-[System Diagnosis] or click the icon ( ).

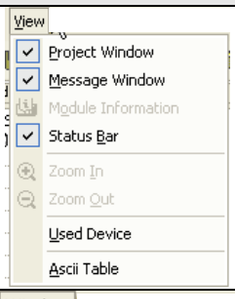
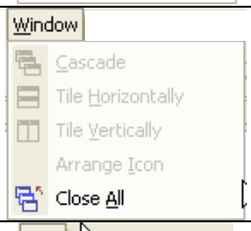
2) Click the right button at the relevalet module and click the 'Frame Monitor' or 'Status By Service' to check the communication



6.5.2 Menu bar and shortcut of XG-PD

The following is menu bar and short cut of XG-PD.

Menu bar		Menu		Icon	Contents
File		New File		Makes new file
		Open...		Opens the saved file
		Open from PLC	-	Opens the file saved in the PLC
		Save		Saves the current file
		Save As	-	Saves the current file with other name
		Print		Prints
		Preview	-	Previews the contents to print
		Print Project	-	Prints the designated parameter
		Print Setup	-	Sets the print and print direction
Edit		Undo		Return to the previous status
		Redo		Cancels the Undo
		Cut		Cuts the contents
		Copy		Copies the contents
		Paste		Pastes the cut contents
		Delete		Deletes
Online		Connect		Connects the PC with PLC
		Connection Settings		Sets the connection method
		Read IO Information		Reads the IO information of PLC
		Write Parameter		Writes the parameter edited in the XG-PD
		Read Parameter		Reads the parameter from the PLC
		Enable Link		Enables the communication of communication module set by P2P or high-speed link.
		Upload/Download (file)	-	This menu is not used by the user.
		SyCon upload		Reads the data set in the SyCon
		System diagnosis		Monitors the operation status of communication module
		Reset	Reset PLC	-	Resets the PLC
			Reset individual module		Resets the individual module
Tools		Customize		-	Edits the tool bar
		Shortcut Settings		-	Edits the shortcut
		Options		-	Sets the project option

Menu bar		Menu	Icon	Contents
View		Project Window	-	Activates the project window
		Message Window	-	Activates the message window
		Module Information	-	Indicates whether system diagnosis is activated or not
		Status Bar	-	Activates the status bar
		Used Device	-	Indicates the device area used in the parameter
		Ascii Table	-	Indicates the Ascii table
Window		Cascade	-	Arranges the window
		Tile Horizontally	-	Arranges the window
		Tile Vertically	-	Arranges the window
		Arrange Icon	-	This menu is not used by the user
		Close All	-	Closes all window
Help		About XG-PD		Indicates the version information of the XG-PD

6.6 How to set the Parameter according to Service

6.6.1 Exclusive Service

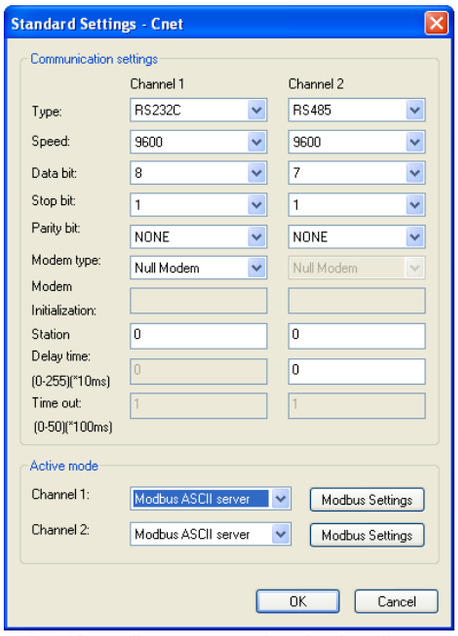
Through this exclusive service function built-in Cnet I/F module, information and data of PLC can be read or written in PC and associated devices without additional programming in PLC. It operates as a server in communication network and responds to memory Read/Write request conforming to exclusive XGT protocol in external devices or PC, or conforming to Modbus protocol. In order to use the exclusive service, select the operation mode for the channel used for server among Cnet channels 1 and 2 when setting basic communication. It supports XGT server and Modbus server which respond to both RTU and ASCII format. Since Cnet I/F module respective channel operates separately, it can not be set to other type of server. Refer to exclusive service related items in “Diagnosis and error code” for details on check and diagnosis of normal operation of the exclusive service.

(1) XGT server

During the exclusive service, all the frames used in XGT server shall not exceed 256 Bytes. And the characters used in all the frames are of ASCII code. If used as multi-drop, up to 32 stations can be connected with. Be careful not to set the duplicated station number to the identical network when setting station number. Communication speed/stop bit/parity bit/data bit of all the Cnet I/F modules shall be surely identical on the network if used as multi-drop. XGT server supports only the memory Read/Write function of the Exclusive XGT protocol.

(2) Modbus server

It is used when the correspondent device to communicate with operates as Modbus Client. It supports both Modbus’s ASCII Mode and RTU Mode, which can be specified in the active mode of standard settings window.



[Figure 6.6.1] Modbus server standard settings screen

Correspondent client device shall request within the range described in the table below.

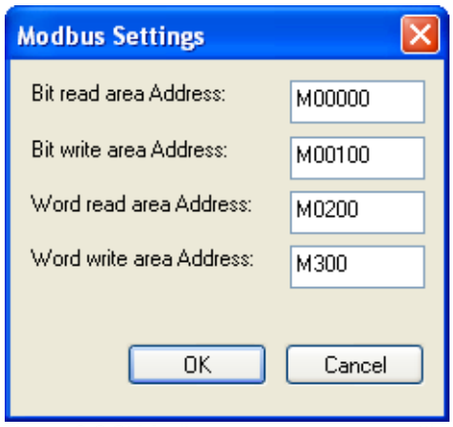
For example, bit Read request is available up to 2000 bits, and bit Write request is available up to 1968 bits (using Modbus RTU).

Code (Hex)	Purpose	Used area	Address	Max. Response data
01	Read Coil Status	BIT OUTPUT	0XXXX	2000 COILS
02	Read Input Status	BIT INPUT	1XXXX	2000 COILS
03	Read Holding Registers	WORD OUTPUT	4XXXX	125 REGISTERS
04	Read Input Registers	WORD INPUT	3XXXX	125 REGISTERS
05	Force Single Coil	BIT OUTPUT	0XXXX	1 COIL
06	Preset Single Register	WORD OUTPUT	4XXXX	1 REGISTER
0F	Force Multiple Coils	BIT OUTPUT	0XXXX	1968 COILS
10	Preset Multiple Registers	WORD OUTPUT	4XXXX	120 REGISTERS

[Table 6.6.1] Modbus command code

For the request of each instruction code, applicable area shall be set for XGT PLC memory.

It is available through “Modbus Setting” window as shown in the figure below which is displayed if “Setting” button clicked after active with Modbus ASCII server/RTU server selected on the “Modbus setting of Cnet operation mode” window.



[Figure 6.6.2] Modbus server memory setting

Details of respective setting item are as follows;

Item	Description	Remarks
DI area address	XGT address applicable to digital input area	Bit address
DO area address	XGT address applicable to digital output area	Bit address
AI area address	XGT address applicable to analog input area	Word address
AO area address	XGT address applicable to analog output area	Word address

[Table 6.6.2] Details of Modbus Area

- The address value set in the respective item is the base address of the applicable area.

- In the [Figure 6.6.2], start address of bit read area is assigned at the first bit of M0000 word. Start address of word write area is assigned at the M300.

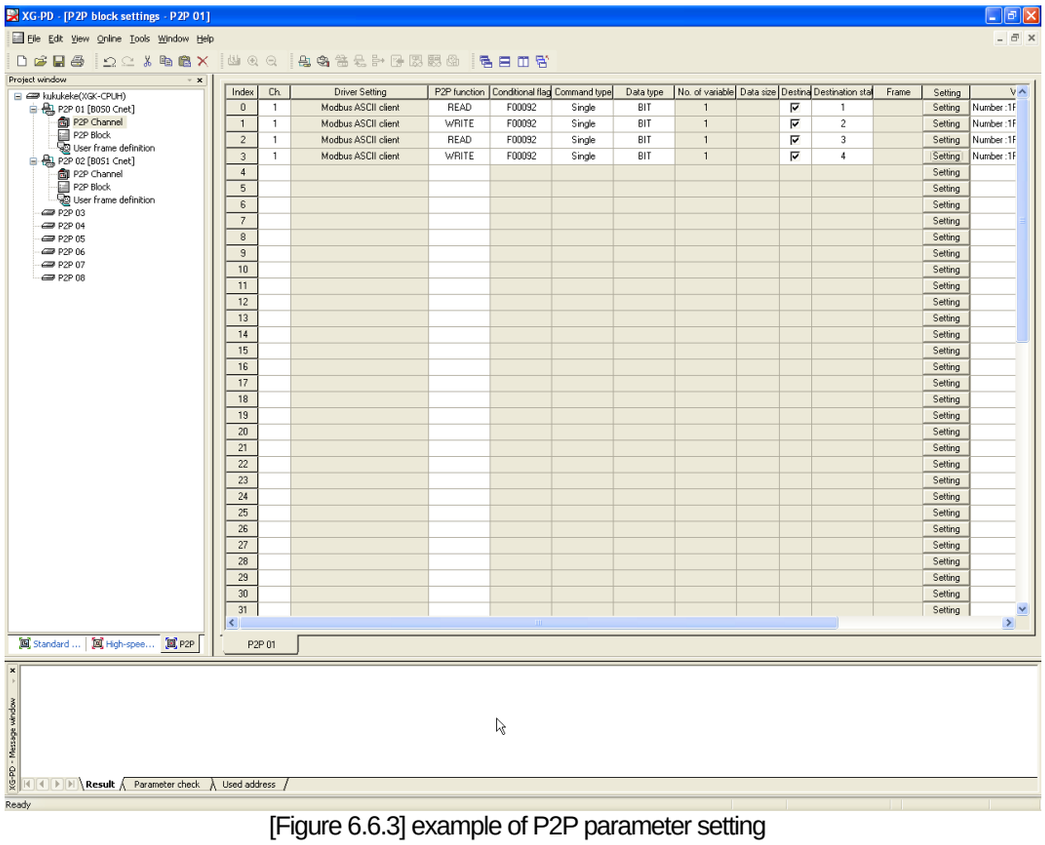
- Address input data should be in effective area like M, P
- Since modbus address is 1~9999 (decimal), size of bit IO is 9999/8=1249.875 (namely 1249, byte should be integer unit)
- The size of word IO is 9999*2=19998 byte.
- In case of XGK CPU, bit read/write address is word + Bit.
  ▷ Example when the first bit of second word of read area is start address (ex: 0x10020)
- In case of XGI CPU, bit read/write address is bit.
  ▷ Example when 10th bit of read area is start address (ex: 0x10009)

6.6.2 P2P service

P2P service executes client operation of the communication module as realized with parameters setting which was set by instruction blocks in case of GM/MK. Four P2P instructions available in Cnet I/F module are Read/Write/Send/Receive. Send/Receive are used in case of 'user definition frame' and Read/Write are used in case of 'XGT dedicated client or 'modbus RTU/ASCII client'.

P2P service's registration and edit is executed in XG-PD where up to 8 P2P parameters can be set. Respective P2P parameter is composed of up to 64 P2P blocks.

The following [Figure 6.6.3] shows an example of P2P parameter setting window in XG-PD.


XG-PD - [P2P block settings - P2P 01]
File Edit View Online Tools Window Help
Project window
kukukeke(XGK-CPUH)
P2P 01 [B0S0 Cnet]
P2P Channel
P2P Block
User frame definition
P2P 02 [B0S1 Cnet]
P2P Channel
P2P Block
User frame definition
P2P 03
P2P 04
P2P 05
P2P 06
P2P 07
P2P 08
Index | Ch. | Driver Setting | P2P function | Conditional flag | Command type | Data type | No. of variable | Data size | Destina | Destination sta | Frame | Setting
0 | 1 | Modbus ASCII client | READ | F00092 | Single | BIT | 1 | 1 | Setting | Number :1F
1 | 1 | Modbus ASCII client | WRITE | F00092 | Single | BIT | 1 | 2 | Setting | Number :1F
2 | 1 | Modbus ASCII client | READ | F00092 | Single | BIT | 1 | 3 | Setting | Number :1F
3 | 1 | Modbus ASCII client | WRITE | F00092 | Single | BIT | 1 | 4 | Setting | Number :1F
Standard ... High-spee... P2P
P2P 01
XG-PD - Message window
Result Parameter check Used address
Ready

[Figure 6.6.3] example of P2P parameter setting

◆ P2P parameters registration window

- Up to 8 P2P parameters can be set
- Multiple P2P parameters can be set for an identical Cnet I/F module
  However, Enable is available only for 1 parameter among the multiple P2P parameters for the identical Cnet I/F module
- Respective P2P parameter is composed of P2P channel, P2P block and user defined frame

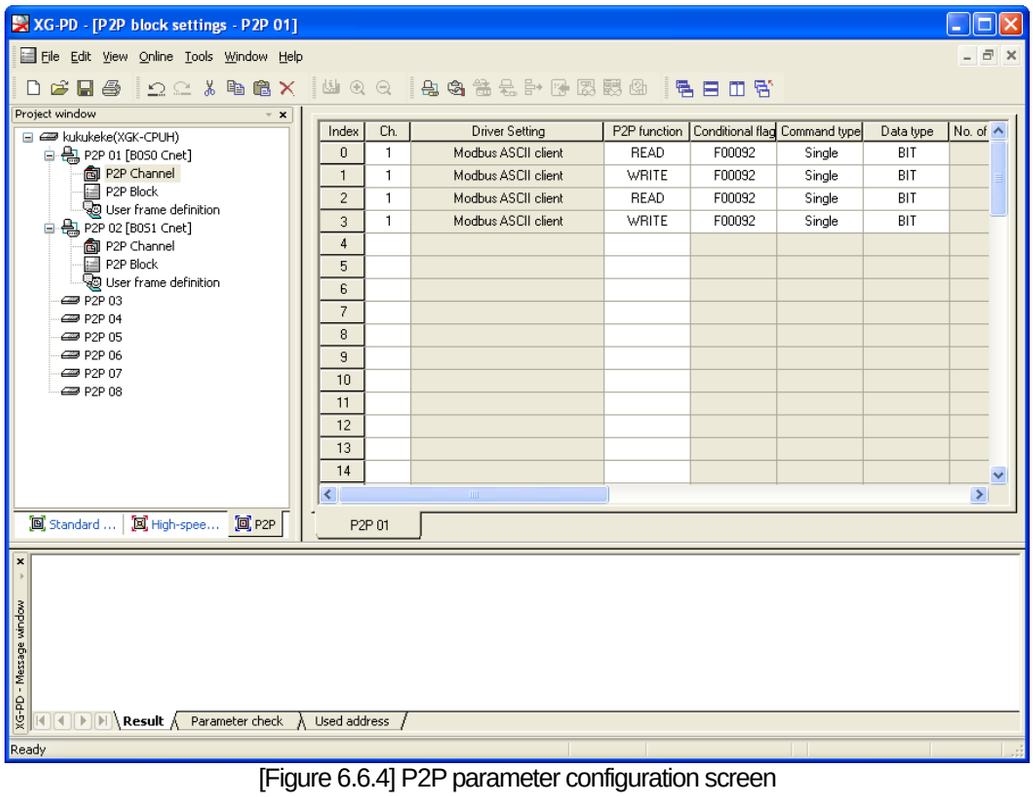
◆ P2P edit window

- Up to 64 P2P blocks can be registered and edited.

(1) Configuration of P2P parameters

In order to use P2P service the user needs to execute setting for the operation desired on the P2P parameters window.

P2P parameters are composed of 3 kinds of information as shown in the figure below



[Figure 6.6.4] P2P parameter configuration screen

▶P2P channel

- P2P channel setting to define the communication protocol of the P2P service to execute
- XGT/Modbus available
- Separate setting for respective channels. Applied only if basic setting's "P2P driver" is None.

▶P2P block

- 64 P2P blocks setting separately operated

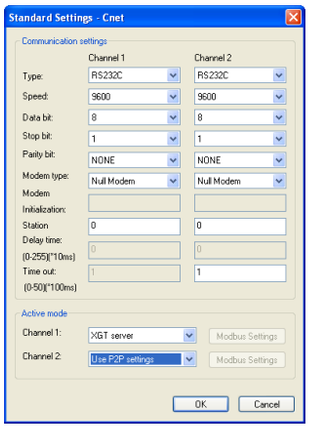
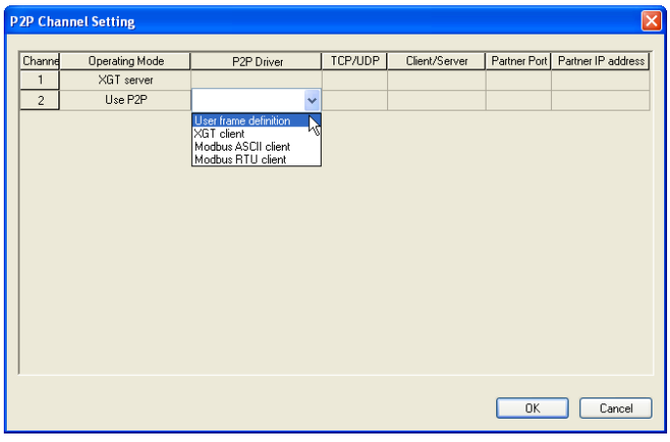
▶User definition frame

- Registration of user defined frame

(2) P2P channel setting

Cnet I/F module provides 2 communication channels (channel 1, channel 2) separately operated.

Driver type of the channels can be defined respectively for P2P service. In order for P2P channel to operate as client, active mode of standard settings should be 'Use P2P'. Channel setting according to active is as follows.

Active mode	P2P Channel setting
	

When selecting 'Use P2P' in the active mode, available driver and meaning in the XGT Cnet are as follows.

Driver	Meaning
User definition frame	When sending/receiving the user definition frame
XGT client	When reading/writing the memory of XGT
Modbus ASCII client	When acting as Modbus client and ASCII mode
Modbus RTU client	When acting as Modbus client and RTU mode

[Table 6.6.3] Driver table

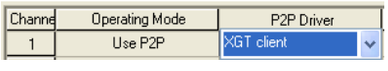
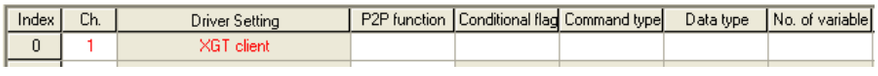
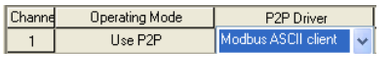
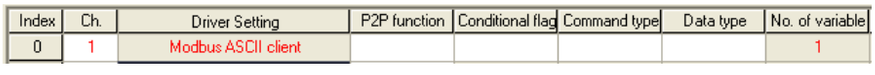
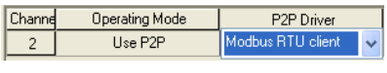
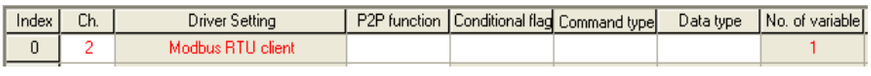
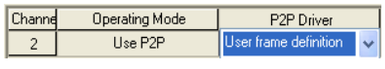
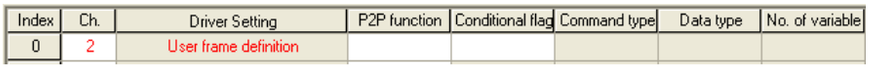
If XGT or modbus is selected as P2P driver about communication channel, the user definition frame can't be used.

▶ Meaning of modbus function code

Code (hex)	Purpose	Data address	Reference
01	Output Contact Status Read (Read Coil Status)	0XXXX(bit-output)	Bit read
02	Input Contact Status Read (Read Input Status)	1XXXX(bit-input)	Bit read
03	Output Register Read (Read Holding Registers)	4XXXX(word-output)	Word read
04	Input Register Read (Read Input Registers)	3XXXX(word-input)	Word read
05	Output Contact 1 Bit Write (Force Single Coil)	0XXXX(bit-output)	Bit write
06	Output Register 1 Word Write (Preset Single Register)	4XXXX(word-output)	Word write
0F	Output Contact Continuous Write (Force Multiple Coils)	0XXXX(bit-output)	Bit write
10	Output Register Continuous Write (Preset Multiple Register)	4XXXX(word-output)	Word write

(3) P2P block setting

If the user selects the P2P block of relevant parameter in the P2P parameter setting window, P2P block setting window shows. Block setting window of all protocol are as follows and activated area is different according to protocol type in the P2P channel.

P2P driver	P2P block setting
	
	
	
	

6.7 Operation Start

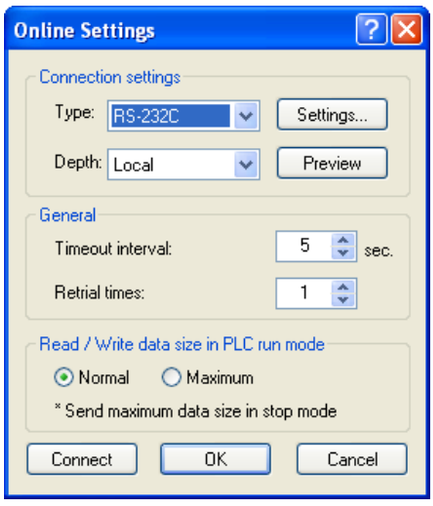
XGT Cent I/F module's operation is divided into P2P service and server function generally. When setting the Cnet I/F module as server, follow the 6.7.1 and when setting the Cnet I/F module as P2P service, follow the 6.7.2 about parameter setting

6.7.1 In case of acting as server

(1) Connection setting

(a) Select [Online]-[Connection settings] or click icon ( ).

(b) After setting the connection option according to user, click the 'connection'.



(2) Reading IO information

Select [Online]-[Read IO Information] or click the icon ( ). Then IO information of currently mounted is shown on the project window.

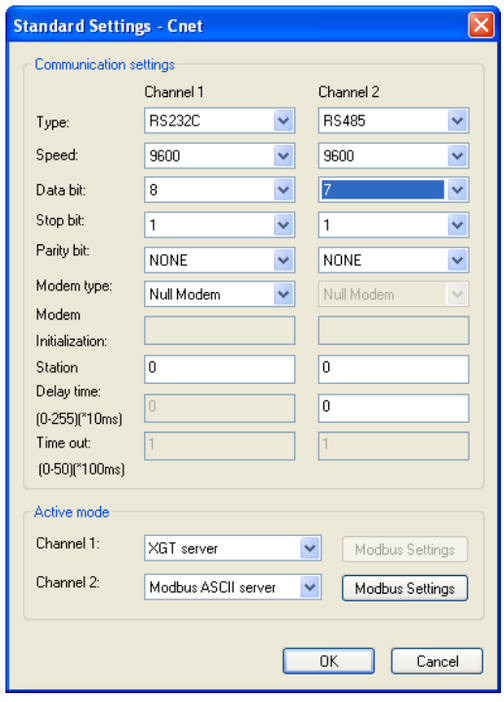
(3) Standard settings

(a) Double-click the relevant Cnet I/F module and execute the standard settings window. Designate the communication type, speed, modem type, data bit, stop bit and station.

(b) Modem initialization is available in case of dial-up modem.

(c) Delay time setting is available in case of RS-422/485 and time out setting is available in case of RS-422/485 P2P mode.

* When using the Modbus ASCII server, data bit should be 7.



(4) Selecting the active mode

(a) Selects the active mode.

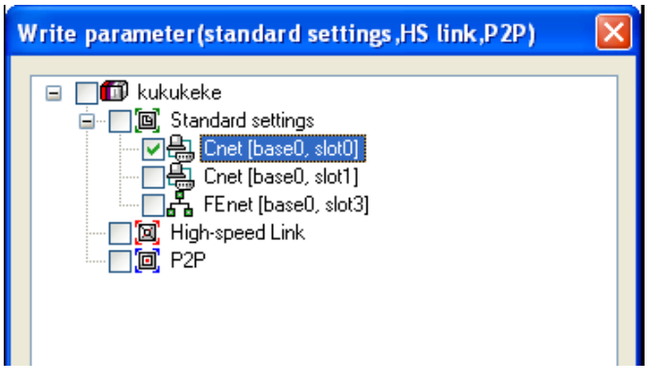
(b) XGT Cnet I/F module supports XGT server, Modbus ASCII server, Modbus RTU server.

(5) Writing the parameter

(a) Select [Online] - [Write Parameter] or click the icon ( ).

(b) Select the module in which parameter setting is completed.

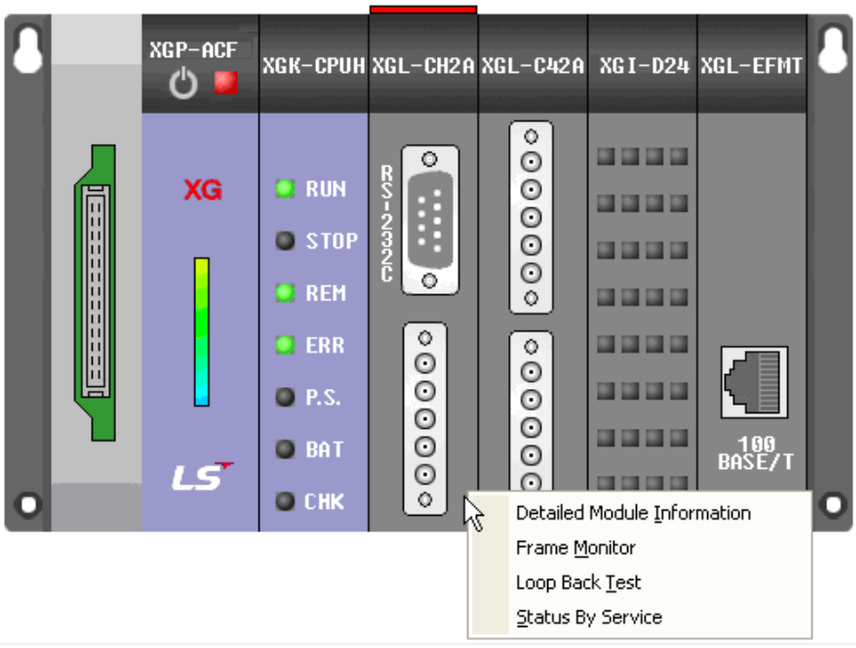
(c) After writing, reset the relevant module.



(6) Checking the operation

(a) Select [Online] – [System Diagnosis] or click the icon ( ).

(b) Click the right button on the the relevant module and click Frame Monitor or Status By Service.


XGP-ACF
XGK-CPUH
XGL-CH2A
XGL-C42A
XGI-D24
XGL-EFMT
XG
RUN
STOP
REM
ERR
P.S.
BAT
CHK
RS-232C
100 BASE/T
Detailed Module Information
Frame Monitor
Loop Back Test
Status By Service

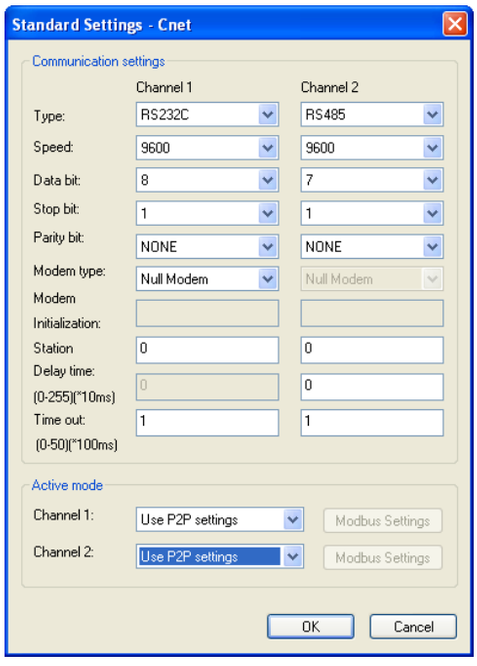
6.7.2 In case of acting as P2P service (client)

(1) Standard settings

(a) Step 1~3 of chapter 6.7.1 is same.

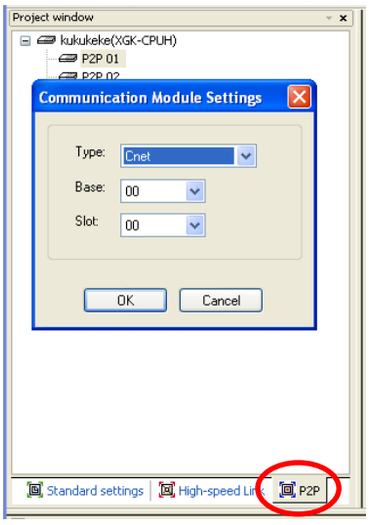
* In case of acting as ASCII client, data bit is 7.

(b) Select Active mode as Use P2P settings.



(2) P2P setting

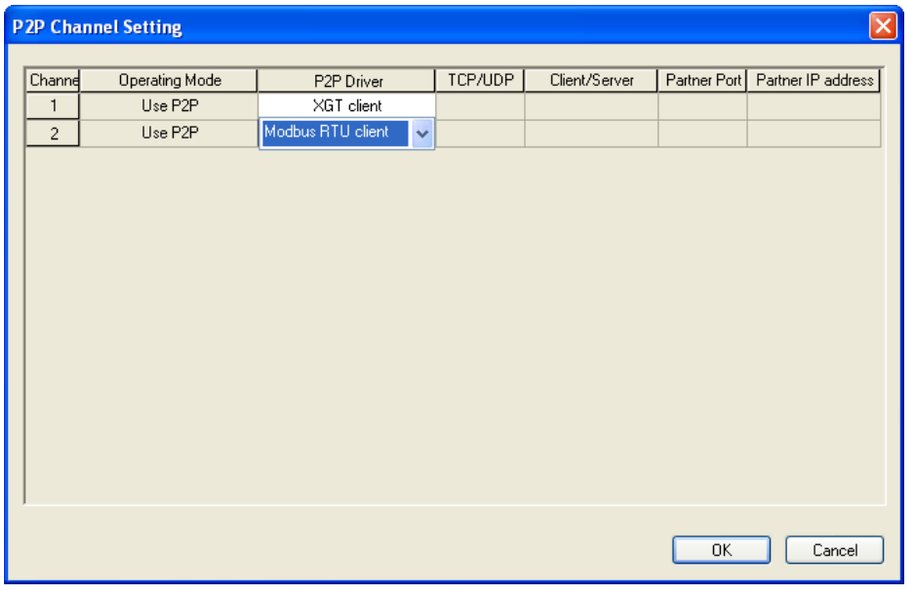
After selecting the P2P setting window, click P2P block address and select base no. and slot no. of communication module.



(3) P2P channel setting

(a) Select P2P Driver according to protocol.

(b) P2P Driver supports User Definition Frame, XGT Client, Modbus RTU/ASCII Client.

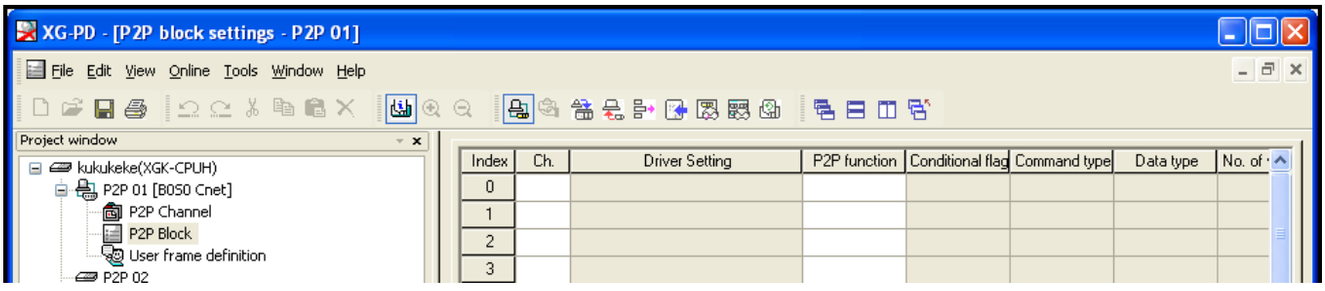


(4) P2P block setting

(a) According to type of client, P2P block setting is activated differently.

(b) Fill the activated cell according to protocol.

*In case of user definition frame, it is available when frame is written in the user definition frame.

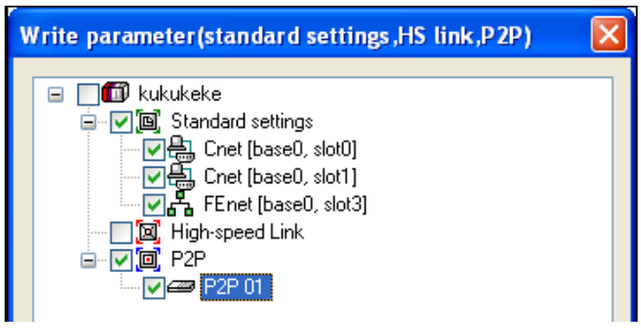


(5) Writing the parameter

(a) Select [Online] – [Write Parameter] or click the icon ( ).

(b) Select the module in which parameter setting is completed.

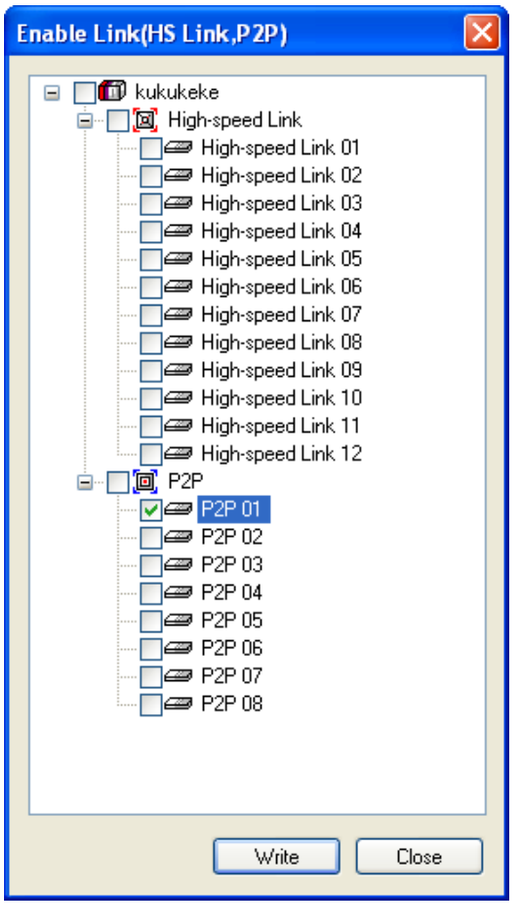
(c) After writing, reset the relevant module.



(6) Enabling the link

(a) Select [Online] – [Enable Link] or click the icon ( ).

(b) Click the P2P to enable and click Write.



* Enable Link through flag
It describes “Enable Link” method through flag. The following XG5000 version, CPU OS version is needed.

Item	Version
XG5000	V3.61 or above
XGR CPU	V1.91 or above
XGI CPU	V3.4 or above
XGK CPU	V3.7 or above

Flag list related with “Enable Link”

-XGR

Flag	Data type	Device	Description
_HS_ENABLE_STATE	ARRAY[0..11] OF BOOL	%FX19040	HS link enable/disable current state
_HS_REQ	ARRAY[0..11] OF BOOL	%FX31520	HS link enable/disable request
_HS_REQ_NUM	ARRAY[0..11] OF BOOL	%FX31536	HS link enable/disable setting
_P2P_ENABLE_STATE	ARRAY[0..7] OF BOOL	%FX19072	P2P enable/disable current state
_P2P_REQ	ARRAY[0..7] OF BOOL	%FX31552	P2P enable/disable request
_P2P_REQ_NUM	ARRAY[0..7] OF BOOL	%FX31568	P2P enable/disable setting

-XGI

Flag	Data type	Device	Description
_HS_ENABLE_STATE	ARRAY[0..11] OF BOOL	%FX15840	HS link enable/disable current state
_HS_REQ	ARRAY[0..11] OF BOOL	%FX16480	HS link enable/disable request
_HS_REQ_NUM	ARRAY[0..11] OF BOOL	%FX16496	HS link enable/disable setting
_P2P_ENABLE_STATE	ARRAY[0..7] OF BOOL	%FX15872	P2P enable/disable current state
_P2P_REQ	ARRAY[0..7] OF BOOL	%FX16512	P2P enable/disable request
_P2P_REQ_NUM	ARRAY[0..7] OF BOOL	%FX16528	P2P enable/disable setting

-XGK

Flag	Data type	Device	Description
_HS1_ENABLE_STATE	BIT	F09600	HS link 1 enable/disable current state
_HS2_ENABLE_STATE	BIT	F09601	HS link 2 enable/disable current state
_HS3_ENABLE_STATE	BIT	F09602	HS link 3 enable/disable current state
_HS4_ENABLE_STATE	BIT	F09603	HS link 4 enable/disable current state
_HS5_ENABLE_STATE	BIT	F09604	HS link 5 enable/disable current state
_HS6_ENABLE_STATE	BIT	F09605	HS link 6 enable/disable current state
_HS7_ENABLE_STATE	BIT	F09606	HS link 7 enable/disable current state
_HS8_ENABLE_STATE	BIT	F09607	HS link 8 enable/disable current state
_HS9_ENABLE_STATE	BIT	F09608	HS link 9 enable/disable current state
_HS10_ENABLE_STATE	BIT	F09609	HS link 10 enable/disable current state
_HS11_ENABLE_STATE	BIT	F0960A	HS link 11 enable/disable current state
_HS12_ENABLE_STATE	BIT	F0960B	HS link 12 enable/disable current state
_HS1_REQ	BIT	F10300	HS link 1 enable/disable request
_HS2_REQ	BIT	F10301	HS link 2 enable/disable request
_HS3_REQ	BIT	F10302	HS link 3 enable/disable request
_HS4_REQ	BIT	F10303	HS link 4 enable/disable request
_HS5_REQ	BIT	F10304	HS link 5 enable/disable request
_HS6_REQ	BIT	F10305	HS link 6 enable/disable request
_HS7_REQ	BIT	F10306	HS link 7 enable/disable request
_HS8_REQ	BIT	F10307	HS link 8 enable/disable request
_HS9_REQ	BIT	F10308	HS link 9 enable/disable request

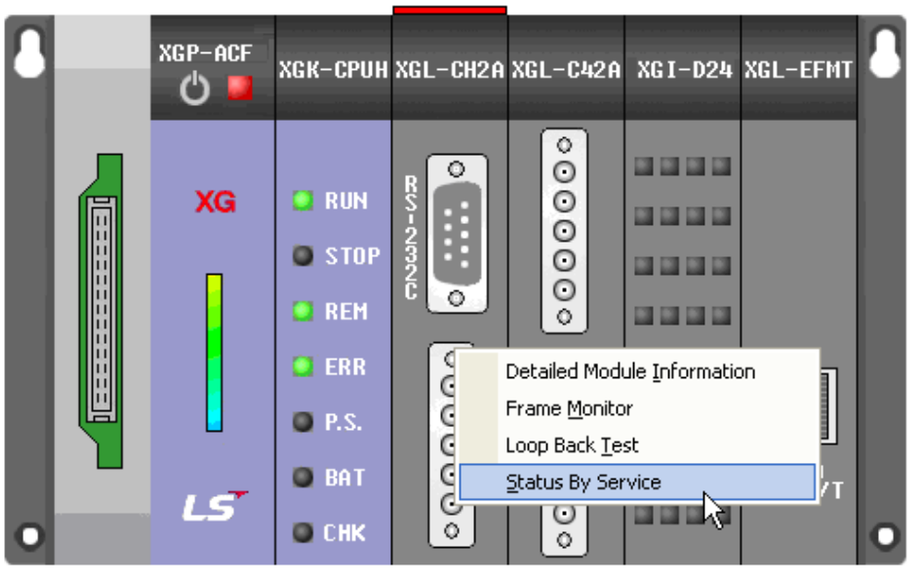
Flag	Data type	Device	Description
_HS10_REQ	BIT	F10309	HS link 10 enable/disable request
_HS11_REQ	BIT	F1030A	HS link 11 enable/disable request
_HS12_REQ	BIT	F1030B	HS link 12 enable/disable request
_HS1_REQ_NUM	BIT	F10310	HS link 1 enable/disable setting
_HS2_REQ_NUM	BIT	F10311	HS link 2 enable/disable setting
_HS3_REQ_NUM	BIT	F10312	HS link 3 enable/disable setting
_HS4_REQ_NUM	BIT	F10313	HS link 4 enable/disable setting
_HS5_REQ_NUM	BIT	F10314	HS link 5 enable/disable setting
_HS6_REQ_NUM	BIT	F10315	HS link 6 enable/disable setting
_HS7_REQ_NUM	BIT	F10316	HS link 7 enable/disable setting
_HS8_REQ_NUM	BIT	F10317	HS link 8 enable/disable setting
_HS9_REQ_NUM	BIT	F10318	HS link 9 enable/disable setting
_HS10_REQ_NUM	BIT	F10319	HS link 10 enable/disable setting
_HS11_REQ_NUM	BIT	F1031A	HS link 11 enable/disable setting
_HS12_REQ_NUM	BIT	F1031B	HS link 12 enable/disable setting
_P2P1_ENABLE_STATE	BIT	F09620	P2P1 enable/disable current state
_P2P2_ENABLE_STATE	BIT	F09621	P2P2 enable/disable current state
_P2P3_ENABLE_STATE	BIT	F09622	P2P3 enable/disable current state
_P2P4_ENABLE_STATE	BIT	F09623	P2P4 enable/disable current state
_P2P5_ENABLE_STATE	BIT	F09624	P2P5 enable/disable current state
_P2P6_ENABLE_STATE	BIT	F09625	P2P6 enable/disable current state
_P2P7_ENABLE_STATE	BIT	F09626	P2P7 enable/disable current state
_P2P8_ENABLE_STATE	BIT	F09627	P2P8 enable/disable current state
_P2P1_REQ	BIT	F10320	P2P1 enable/disable request
_P2P2_REQ	BIT	F10321	P2P2 enable/disable request
_P2P3_REQ	BIT	F10322	P2P3 enable/disable request
_P2P4_REQ	BIT	F10323	P2P4 enable/disable request
_P2P5_REQ	BIT	F10324	P2P5 enable/disable request
_P2P6_REQ	BIT	F10325	P2P6 enable/disable request
_P2P7_REQ	BIT	F10326	P2P7 enable/disable request
_P2P8_REQ	BIT	F10327	P2P8 enable/disable request
_P2P1_REQ_NUM	BIT	F10330	P2P1 enable/disable setting
_P2P2_REQ_NUM	BIT	F10331	P2P2 enable/disable setting
_P2P3_REQ_NUM	BIT	F10332	P2P3 enable/disable setting
_P2P4_REQ_NUM	BIT	F10333	P2P4 enable/disable setting
_P2P5_REQ_NUM	BIT	F10334	P2P5 enable/disable setting
_P2P6_REQ_NUM	BIT	F10335	P2P6 enable/disable setting
_P2P7_REQ_NUM	BIT	F10336	P2P7 enable/disable setting
_P2P8_REQ_NUM	BIT	F10337	P2P8 enable/disable setting

▶ How to enable link
-HS link/P2P enable/disable setting flag ON → HS link/P2P enable/disable request flag ON
▶ How to disable link
-HS link/P2P enable/disable setting flag OFF → HS link/P2P enable/disable request flag ON
▶ You can monitor the Enable/Disable state of the each link through “enable/disable current states” flag.

(7) Checking the operation

(a) Select [Online] – [System Diagnosis] or click the icon ( ).

(b) Click the right button on the relevant module and click Frame Monitor or Status By Service.



6.8 Diagnosis Function of XG-PD

6.8.1 Type of diagnosis function

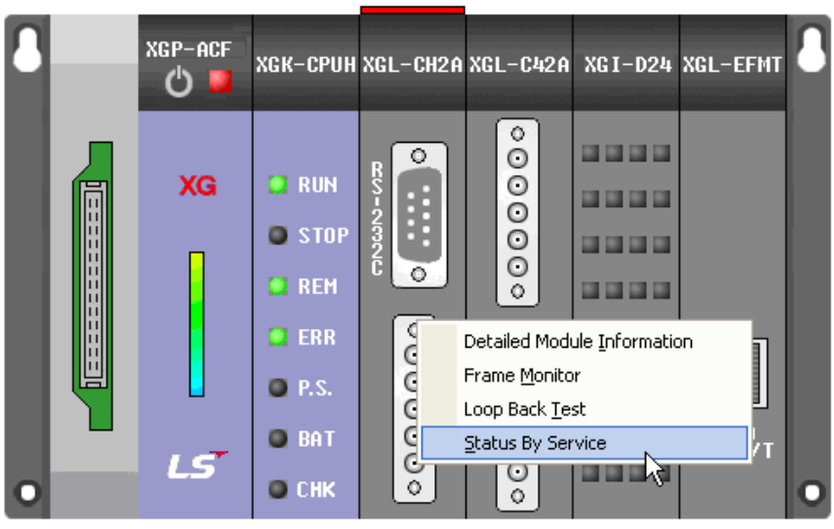
The user can check/diagnose the status of network/system by using the XG-PD.

1) CPU module information
2) Detailed module information
3) Frame monitor
4) Loop back test
5) Status by service

(1) System diagnosis

How to check/diagnose the status of network/system by using the XG-PD is described below.

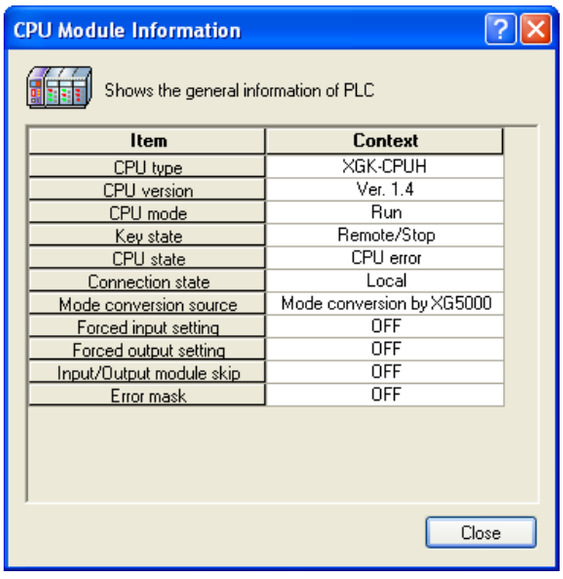
(a) Select [Online] – [System Dianosis] and click the icon ( ).
(b) Click the right button on the the relevant module and click Frame Monitor or Status By Service.



6.8.2 Checking the CPU status

(1) CPU module information

(a) Select [Online] – [System Diagnosis] or click the icon ( ).
(b) Click the right button on the the CPU module and click CPU module information.

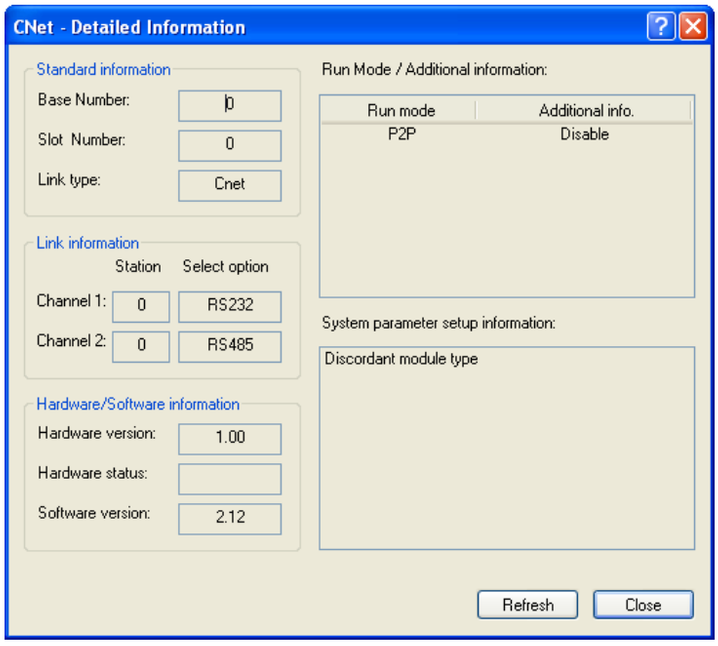


6.8.3 Communication module information

(1) Communication module information

(a) Select [Online] – [System Diagnosis] or click the icon ( ).

(b) Click the right button on the the relevant module and click Detailed information.



(2) Meaning of communication module information item

Item			Contents
Standard information	Base Number		Information of base number under diagnosis
	Slot Number		Information of slot number under diagnosis
	Link Type		Type of communication module under diagnosis
Link information	Station		Station address used in the dedicated service and P2P
	Select Option		Information about communication type (RS-232C, RS-422)
Hardware/Software information	Hardware version		Hardware version of communication module
	Hardware status		Hardware status of communication module
	Software version		OS version of communication module
RUN mode/ Additional information	Run mode		Service information (dedicated service, P2P)
	Additional info.	P2P	Enable/Disable
		Dedicated service	Indicates the driver type of dedicated service
		PADT	Indicates the remote 1/2 connection
System parameter setup information			Indicates if standard parameter is downloaded or not. Error information of standard communication parameter

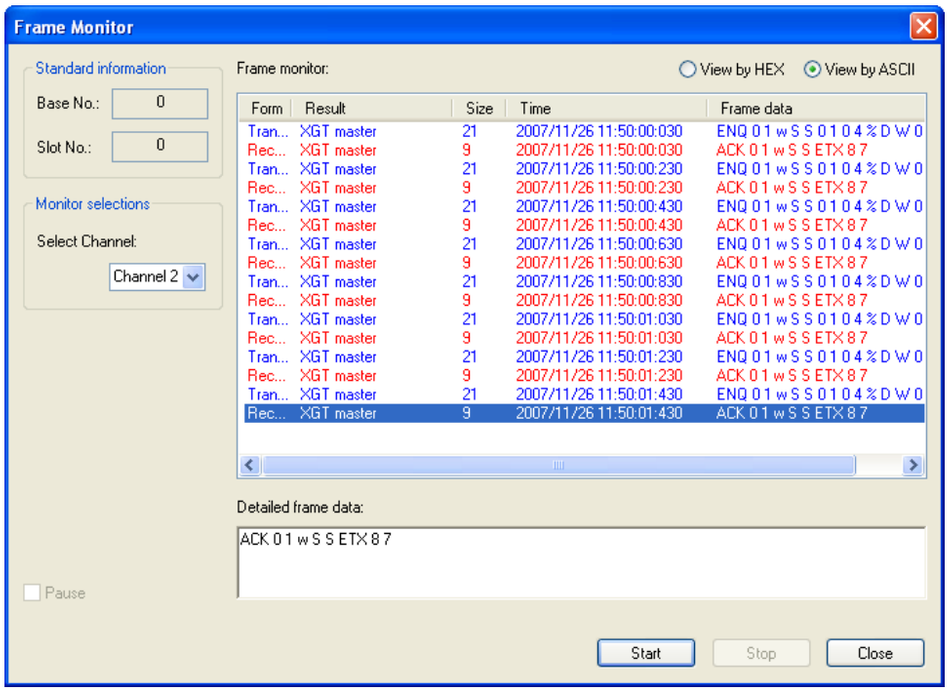
6.8.4 Frame monitor

The user can check the TRX frame of Cnet module by using the frame monitor.

(1) Frame monitor

(a) Select [Online] – [System Diagnosis] or click the icon ( ).

(b) Click the right button on the the Cnet module and click Frame Monitor.


Frame Monitor
Standard information
Base No.: 0
Slot No.: 0
Monitor selections
Select Channel:
Channel 2
Pause
Frame monitor:
View by HEX
View by ASCII
Form Result Size Time Frame data
Tran... XGT master 21 2007/11/26 11:50:00:030 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:030 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:230 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:230 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:430 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:430 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:630 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:630 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:830 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:830 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:01:030 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:01:030 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:01:230 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:01:230 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:01:430 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:01:430 ACK 0 1 w S S ETX 8 7
Detailed frame data:
ACK 0 1 w S S ETX 8 7
Start
Stop
Close

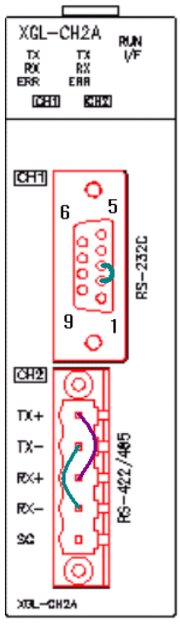
(2) Detail of frame monitor items

Item		Contents
Standard information	Base No.	Information of base number under diagnosis
	Slot No.	Information of slot number under diagnosis
Monitor selections	Select Channel	Select channel to monitor
Frame monitor window	From	Indicates whether it is TX or RX frame.
	Result	Indicates the protocol type 1) XGT server 2) XGT client 3) Modbus server 4) Modbus client 5) User definition frame 6) Unknown : frame that Cnet can't deal with
	Size	Size of frame
	Time	Time when sending/receiving the frame
	Frame data	Indicates the frame data
View by HEX		Indicates the frame data as HEX
View by ASCII		Indicates the frame data as ASCII
Start		Starts the frame monitor
Stop		Stops the frame monitor

6.8.5 Loop back test

(1) How to wire the module

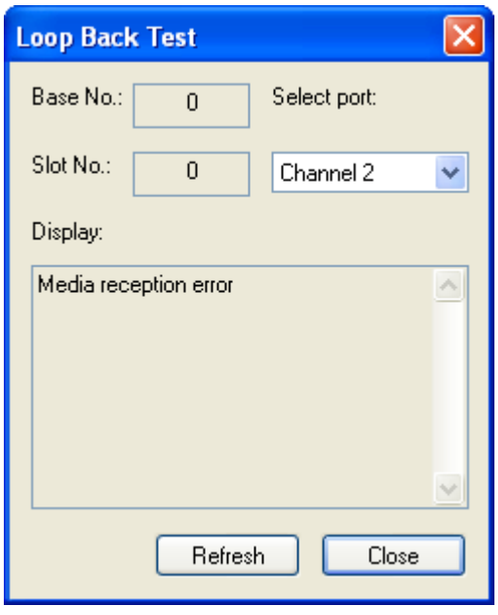
(a) Set actiive mode of test module as server.
(b) Disable the P2P link of test module.
(c) Wire like figure below according to communication port.
1) RS-232C communication: connect no. 2 with no. 3
2) RS-422/485 communication: connect TX+ with RX+ and TX- with RX-



(d) Select [Online] – [System Diagnosis] or click the icon ( ).

(2) Loop back test

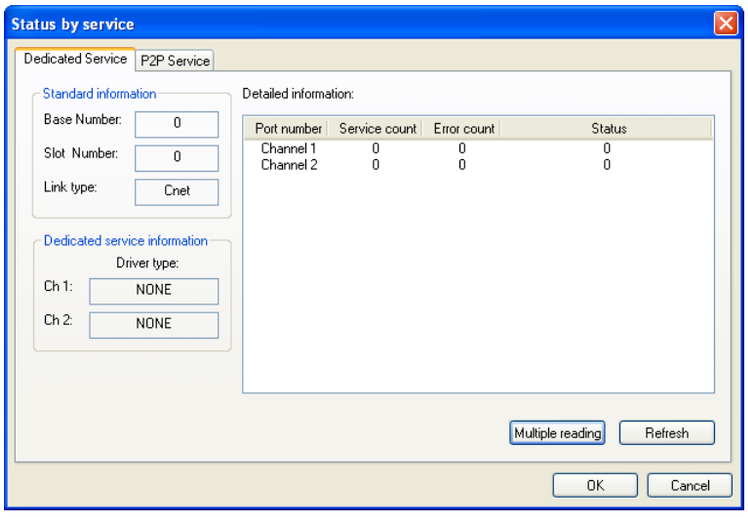
Select channel to test and click ‘Refresh’.



6.8.6 Status by service

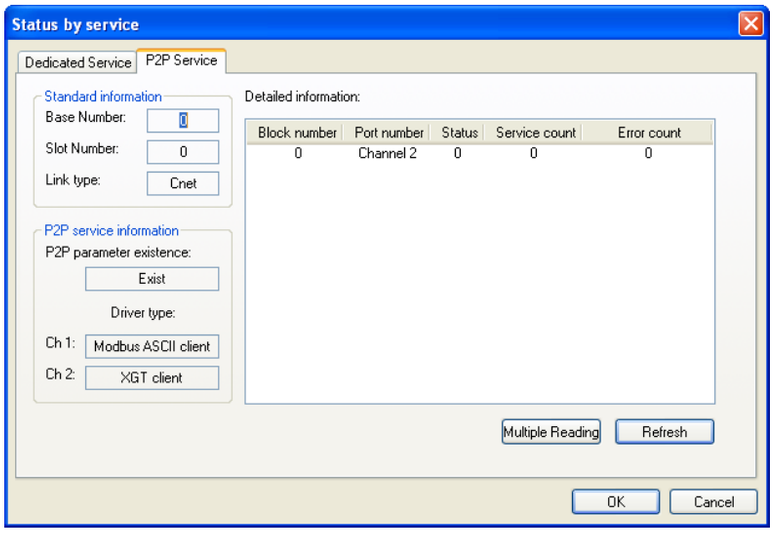
(1) Dedicated service

(a) Select [Online] – [System Diagnosis] or click the icon ( ).
(b) Click the right button on the the Cnet I/F module and click Status By Service.
(c) Click Dedicated Service tap.
(d) Click Multiple reading and check the status by service.



(2) P2P service

(a) Select [Online] – [System Diagnosis] or click the icon ( ).
(b) Click the right button on the the Cnet I/F module and click Status By Service.
(c) Click P2P Service tap.
(d) Click Multiple reading and check the status by service.



(3) Meaning of status by service

Classification	Item		Contents
Dedicated Service	Standard information	Base Number	Information of base number under diagnosis
		Slot Number	Information of slot number under diagnosis
		Link type	Type of communication module under diagnosis
	Dedicated service information		Drive type by service
	Detailed information window	Port number	Channel number
		Service count	Indicates how many dedicated service communication is done
		Error count	Indicates how many error occurs during dedicated service communication
		Status	Indicates status of dedicated service communication
P2P Service	Standard information	Base Number	Information of base number under diagnosis
		Slot Number	Information of slot number under diagnosis
		Link type	Type of communication module under diagnosis
	P2P service information	P2P parameter existence	Indicates whether P2P parameter exists or not
		Driver type	Indicates the P2P driver by port XGT/Modbus/User definition frame
	Detailed information	Block number	Available range:0~63 Only block under operation is indicated.
		Port number	Indicates the channel number
		Status	Indicates the status by service
		Service count	Indicates how many P2P service is done.
		Error count	Indicates how many error occurs during service
Multiple reading/ Refresh	Multiple reading		Checks the P2P service status every second.
	Refresh		Check the P2P service status when refresh is done.

(4) Error according to status code by service
It is used to check whether Cnet I/F module is normal or not.

Dedicated service		P2P service	
Status	Meaning	Status	Meaning
0	Normal	0	Normal
1	Error of RX frame head (There is no ACK/NAK.)	4	Error of max. station number (Available range: 0~31)
2	Error of RX frame tail (There is no tail.)	5	Time out
3	BCC error of RX frame	FFFE	1. Modbus address error 2. Commands except Read/Write are used.
9	Station number of RX frame is different with self station number (Self station number = 0)	-	
0A	In case of not get response from CPU		
0B	RX frame size exceeds the modbus max. frame size		
0C	RX frame is not Modbus ASCII/RTU.		
0D	HEX conversion error in Modbus		

Chapter 7 XGT Dedicated Communication

7.1 Summary of Protocol

7.1.1 Summary

XGT protocol is developed by LSIS for XGT Cnet I/F module, which allows the user to read/write the data, monitor by registration of monitor variable and read/write the XG5000 program of remote PLC CPU through remote connection of remote PLC CPU. By using the XG – PD frame monitor, the user can check the TRX frame during the communication. XGT protocol is divided into XGT client (which requests writing/reading the data) and XGT server (which responds to XGT client).

(1) Writing/Reading the data

Without extra expense, the user can use the functions to read/write the data of inner device area, execute the monitor and register the monitor easily with only Cnet I/F module.

(2) Writing/Reading the file

The user can read/write the program and parameter saved in the remote PLC CPU through remote 1, 2 connection by using the XGT Cnet I/F module.

(3) Frame monitoring

Frame monitoring function of XG-PD allows the user can see the TRX frame during the communication. By using this function, the user can analyze the data, check the error code and solve the problem developed during the communication.

(4) XGT client, server

When using the XGT protocol, XGT client requests writing/reading the data. XGT server analyzes the received data. In case of normal frame, XGT server deals with the received data with ACK response and in case of abnormal frame, XGT transmits the NAK response including error code to XGT client.

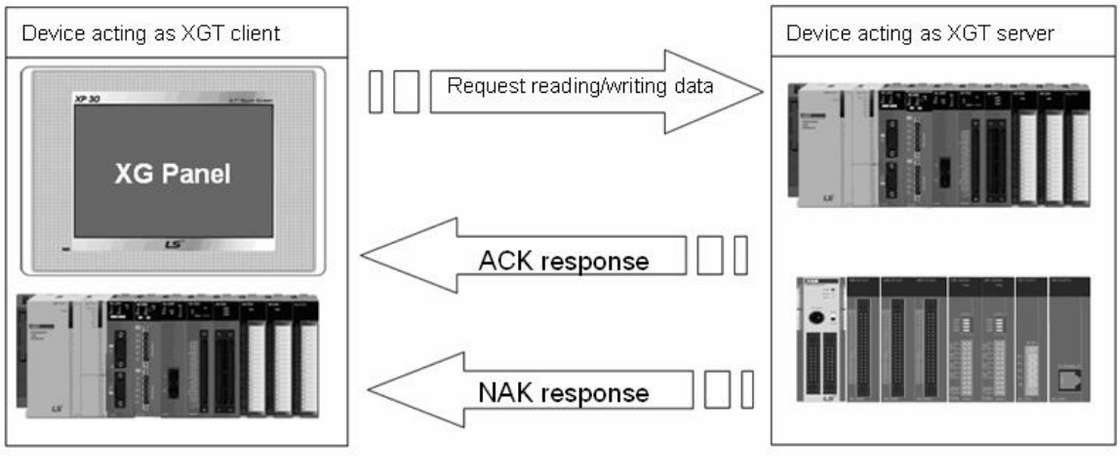
(5) Cnet I/F module provides the following functions when using the XGT protocol

(a) RS-232C and RS-422/RS-485 acts as independently
(b) Single / Continuous Device Write
(c) Single / Continuous Device Read
(d) Registration of Monitor Variable
(e) Execution of Monitor
(f) 1:1 connection (LS link) system configuration (Cnet I/F module: RS-232C)

7.2 Frame Structure

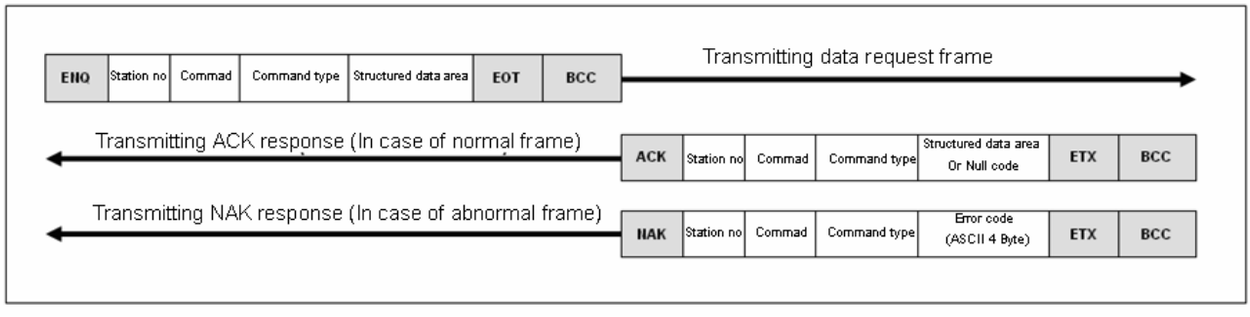
7.2.1 Frame structure

Frames of the XGT protocol are divided into request frame that request writing/reading the data and response frame that responds to request frame.



(1) Sequence of instruction frame

If XGT client transmits the specified request frame into server, server analyzes the received frame. If frame is suited for XGT protocol, server transmits the ACK response and if frame is not suited for XGT protocol, server transmits the NAK response including the error code.



(2) Basic structure of XGT protocol frame

(a) Request frame (acts as XGT client)

Head (ENQ)	Destination station no.	Instruction	Instruction type	Structured data area	Tail (EOT)	Frame check (BCC)

(b) Response frame (acts as XGT server)

1) ACK response frame (frame that is suited for XGT protocol)

Head (ACK)	Self station no.	Instruction	Instruction type	Structured data area or null code	Tail (ETX)	Frame check (BCC)

2) NAK response frame (frame that is not suited for XGT protocol)

Head (NAK)	Self station no.	instruction	Instruction type	Error code (ASCII type 4 byte)	Tail (ETX)	Frame check (BCC)

(3) Frame characteristic

(a) Numerical data of frame are displayed as ASCII code about hexadecimal value as long as there is no special notice.

(b) The following items are displayed as hexadecimal.

1) Station number
2) Instruction type as of figures (= data type) when main instruction is R(r) and W(w)
3) All items indicating total data size in structured data area
4) Instruction registration number for monitor registration and execution instruction
5) All contents of data

(c) If hexadecimal data is applied, the hexadecimal type of data is indicated with 'H' attached in front of figures inside frame like H01, H12345, H34, H12 & H89AB.

(d) Available frame length is up to 256 Bytes.

(e) Details of used control code are as follows.

Code	Hex value	Designation	Control Detail
ENQ	05	Enquire	Request frame's Start code
ACK	06	Acknowledge	ACK response frame's Start code
NAK	15	Not Acknowledge	NAK response frame's Start code
EOT	04	End of Text	Frame End ASCII code used for Request
ETX	03	End Text	Frame End ASCII code used for Response

(f) If the instruction is of small letter (r), BCC value is added to Frame Check and if it is of capital letter (R), no BCC value is added.

Ex) Device read instruction R®

- in case of small letter r: BCC added
- in case of capital letter R: BCC not added

7.2.2 Instruction list

(1) Type of instruction

Instructions used in dedicated communication are as follows.

Classification / Item		Instruction				Description
		Main instruction		Instruction type		
		Frame ex.	Hex	Frame ex.	Hex	
Reading device	Reading single data	r(R)	h72(h52)	SS	h5353	Reads direct variables in Bit, Byte
	Reading continuous data	r(R)	h72(h52)	SB	h5342	Reads direct variable in Word by block unit (Continuous Read of Bit is unavailable)
Writing device	Writing single data	w(W)	h77(h57)	SS	h5353	Writes data on direct variable in Bit, Word
	Writing continuous data	w(W)	h77(h57)	SB	h5342	Writes on direct variable in Word by block unit (Continuous Write of Bit is unavailable)

Classification / Item	Instruction				Description
	Main instruction		Instruction type		
	Frame ex.	Hex	Frame ex.	Hex	
Monitor variable registration	x(X)	h78(h58)	00 ~ 09	h3030 ~ 3039	Registers the variable to monitor
Monitor execution	y(Y)	h79(h59)	00 ~ 09	h3030 ~ 3039	Executes monitoring of registered variable

(2) Data type

Data Type	Display	Example
Bit	X(58h)	%PX000,%MX000,%LX000,%KX000,%CX000,%TX000,%FX000, %IX0.0.0,%QX0.0.0 ,%UX00.00.0 etc.
Byte	B(42h)	%PB000,%MB000,%LB000,%KB000,%CB000,%TB000,%FB000, %IB0.0.0,%QB0.0.0 etc.
Word	W(57h)	%PW000,%MW000,%LW000,%KW000,%CW000,%TW000,%FW000, %DW000,%IW0.0.0,%QW0.0.0,%MW0,%RW0,%WW0,%UW00.00 etc.
Dword	D(44h)	%PD000,%MD000,%LD000,%KD000,%CD000,%TD000,%FD000,%DD000, %SD 000,%ID0.0.0,%QD0.0.0,%MD0,%RD0,%WD0 etc.
Lword	L(4Ch)	%PL000,%ML000,%LL000,%KL000,%CL000,%TL000,%FL000,%DL000,%SL000, %IL0.0.0,%QL0.0.0,%ML0,%RL0,%WL0 etc.

Dword is 4 byte and Lword is 8 byte.

(3) Available device area

CPU	Area	Range	Size(Word)	Remarks
XGK	P	P0~P2047	2048	Read/Write/Monitor available
	M	M0~M2047	2048	Read/Write/Monitor available
	K	K0~K2047	2048	Read/Write/Monitor available
	F	F0~F2047	2048	Read/Monitor available (write: available from 1025)
	T	T0~T2047	2048	Read/Write/Monitor available
	C	C0~2047	2048	Read/Write/Monitor available
	L	L0~L11263	11264	Read/Write/Monitor available
	N	N0~N21503	21504	Read/Write/Monitor available
	D	D0~D32767	32768	Read/Write/Monitor available, XGK–CPUH
		D0~D19999	20000	Read/Write/Monitor available, XGK–CPUS
	R	R0~R32767	32768	Read/Write/Monitor available
	ZR	ZR0~ZR65535	65536	Read/Write/Monitor available, XGK–CPUH
XGI	I	IW0.0.0~IW127.15.3	8192	Read/Write/Monitor available, XGI–CPUU
	Q	QW0.0.0~QW127.15.3	8192	Read/Write/Monitor available, XGI–CPUU
	M	MW0~MW131071	131072	Read/Write/Monitor available, XGI–CPUU
	R	RW0~RW32767	32768	Read/Write/Monitor available, XGI–CPUU
	W	WW0~WW65535	65536	Read/Write/Monitor available, XGI–CPUU
XGR	I	IW0.0.0~IW127.15.3	8192	Read/Write/Monitor available
	Q	QW0.0.0~QW127.15.3	8192	Read/Write/Monitor available
	M	MW0~MW131071	131072	Read/Write/Monitor available
	R	RW0~RW32767	32768	Read/Write/Monitor available
	W	WW0~WW65535	65536	Read/Write/Monitor available
Common	U	U0~U4095	4096	Monitor available

Notes

1) ZR device is provided only in XGK–CPUH.
2) ZR device shall be requested with “W” used.
   Ex.) If Word size is requested from ZR0, it shall be requested by “%WW000”.
3) Monitoring address of bit area is hexadecimal value and monitoring address of word area is decimal value in the U device

7.2.3 Writing the single direct variable (W(w)SS)

This function is used to directly write the PLC device applicably to its data type.

(1) Example of XGT client single write frame

Classification	Head	Station no.	Instruction	Instruction type	No. of blocks	Variable Length	Variable Name	Data	...	Tail	Frame check
Frame	ENQ	20	W(w)	SS	01	06	%MW100	00E2	...	EOT	BCC
Hex	h05	h3230	h57(77)	h5353	h3031	h3036	h254D57313030	h30304532	...	h04	

1 block (Up to 16 blocks available repeatedly)

(2) Example of response frame of XGT server

(a) In case of ACK response

Classification	Head	Station no.	Instruction	Instruction type	Tail	Frame Check
Frame	ACK	20	W(w)	SS	ETX	BCC
Hex	h06	h3230	h57(77)	h5353	h03	

(b) In case of NAK response

Classification	Head	Station no.	Instruction	Instruction type	Error code (2 byte)	Tail	Frame Check
Frame	NAK	20	W(w)	SS	4252	ETX	BCC
Hex	h15	h3230	h57(77)	h5353	h34323532	h03	

(3) Meaning of each item

Item	Description
Number of Blocks	▶ Specify the number of blocks composed of '[Variable Length][Variable Name]' -Max. setting range : 16 blocks -Setting range : H01(ASCII value:3031) ~ H10(ASCII value:3130)
Variable Length	▶ Number of letters of Variable Name -Max. setting range : 16 -Setting range : H01(ASCII value:3031) ~ H10(ASCII value:3130) Ex.) If Variable Name is %MW0 whose letters are 4, its Variable Length is H04. If Variable Name is %MW000 whose letters are 6, its Variable Length is H06.
Variable Name	▶ Read device's address -Setting range : within 12 letters available to input -Caution: Others than figure, capital/small letter and '%' are not allowed.
Data	▶In case that value to write is hA, format of data should be h000A. Ex.) If data type of value to write is word and data is h1234, ASCII code conversion value is 31323334 and this value should in the data area. The first value should be transmitted first and the last value should be transmitted lastly.

Item	Description
Frame Check	▶ If the instruction is of small letter (r), BCC data is added and if it is of capital letter (R), no BCC data is added. ▶ If the instruction is of small letter(r), ENQ ~ EOT are converted to ASCII value, which is added respectively, where the last 1 byte only of the result shall be contained in the frame as BCC.

Notes

1) Each block's device data type should be same.
2) In case that data type is bit, the read data is displayed as hexadecimal 1 byte.
   If bit value is 0, it is displayed as h00(3030).
   If bit value is 1, it is displayed as h01(3031).

(4) Example of use

Example is to write "hFF" at the M230 of station no.1

(a) XGT client: Request frame to write single data

Classification	Head	Station no.	Instruction	Instruction type	No. of blocks	Variable Length	Variable Name	Data	Tail	Frame Check
Frame	ENQ	01	W(w)	SS	01	06	%MW230	00FF	EOT	BCC
Hex	h05	h3031	h57(77)	h5353	h3031	h3036	h254D57323330	h30304646	h04	

(b) Response frame of XGT server

▷ In case of ACK response

Classification	Head	Station no.	Instruction	Instruction type	Tail	Frame Check
Frame	ACK	01	W(w)	SS	ETX	BCC
Hex	h06	h3031	h57(77)	h5353	h03	

▷ In case of NAK response

Classification	Head	Station no.	Instruction	Instruction type	Error code	Tail	Frame Check
Frame	NAK	01	W(w)	SS	Error code (2 byte)	ETX	BCC
Hex	h15	h3031	h57(77)	h5353	Error code (4 byte)	h03	

7.2.4 Reading single direct variable (R(r)SS)

▷ This function is used to directly specify and read the PLC device applicably to its data type.

▷ Up to 16 separate devices memory can be read at a time.

(1) Example that XGT client requests reading single direct variable

Classification	Head	Station no.	Instruction	Instruction type	No. of blocks	Variable Length	Variable Name	· · ·	Tail	Frame Check
Frame	ENQ	20	R(r)	SS	01	06	%MW100	· · ·	EOT	BCC
Hex	h05	h3230	h52(72)	h5353	h3031	h3036	h254D57313030	· · ·	h04	

1 block — Up to 16 blocks available repeatedly

(2) Example of response frame of XGT server

(a) In case of ACK response

Classification	Head	Station no.	Instruction	Instruction type	No. of blocks	No. of data	Data	.....	Tail	Frame Check
Frame	ACK	20	R(r)	SS	01	02	A9F3		ETX	BCC
Hex	h06	h3230	h52(72)	h5353	h3031	h3032	h41394633		h03	

1 block — Up to 16 blocks available repeatedly

(b) In case of NAK response

Classification	Head	Station no.	Instruction	Instruction type	Error code (2 byte)	Tail	Frame Check
Frame	NAK	20	R(r)	SS	1132	ETX	BCC
Hex	h15	h3230	h52(72)	h5353	h31313332	h03	-

(3) Meaning of each item

Classification	Description
Number of Blocks	▶ Specify the number of blocks composed of '[Variable Length][Variable Name]' -Max. setting range : 16 blocks -Setting range : H01(ASCII value:3031) ~ H10(ASCII value:3130)
Variable Length	▶ Number of letters of Variable Name -Max. setting range : 16 -Setting range : H01(ASCII value:3031) ~ H10(ASCII value:3130) Ex.) If Variable Name is %MW0 whose letters are 4, its Variable Length is H04. If Variable Name is %MW000 whose letters are 6, its Variable Length is H06.
Variable Name	▶ Read device's address -Setting range : within 12 letters available to input -Caution: Others than figure, capital/small letter and '%' are not allowed.

<table>
<tr><th>Classification</th><th>Description</th></tr>
<tr><td>No. of data</td><td>▶Specify the no. of byte of Hex type and its type is ASCII.
▶This number is determined by data type (X, B, W, D, L) contained in direct variable name of external communication device request format.
▷Number of data according to variable type is as follows.
<table>
<tr><th>Data type</th><th>Available direct variable</th><th>Data number</th></tr>
<tr><td>Bit(X)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)X</td><td>1</td></tr>
<tr><td>Byte(B)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)B</td><td>1</td></tr>
<tr><td>Word(W)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)W</td><td>2</td></tr>
<tr><td>Dword(D)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)D</td><td>4</td></tr>
<tr><td>Lword(L)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)L</td><td>8</td></tr>
</table></td></tr>
<tr><td>Data</td><td>▶Value that hex value is converted into ASCII code is saved.
▷Ex. 1
If no. of data is h04 (ASCII code: h3034), 4 byte hex data is in the data.

▷Ex. 2
If no. of data is h04 and the data is h12345678, ASCII conversion value is “31 32 33 34 35 36 37 38”. This contents is included in the data area. The first value should be transmitted first and the last value should be transmitted lastly.</td></tr>
</table>

Notes

1) In case that data type is bit, the read data is displayed as byte type.
If bit value is 0, it is displayed as h00(3030).
If bit value is 1, it is displayed as h01(3031).

(4) Example

Example that M020’s 1 word and P001’s 1 word of station No.1 are read.
(At this time, it is supposed that H1234 is in M020 and H5678 is in P001.)

(a) XGT client's request frame that requests reading single variable

Classification	Head	Station no.	Instruction	Instruction type	No. of block	Variable length	Variable name	Variable length	Variable name	Tail	Frame Check
Frame	ENQ	01	R(r)	SS	02	06	%MW020	06	%PW001	EOT	BCC
Hex	h05	h3031	h52(72)	h5353	h3032	h3036	h254D57303230	h3036	h25505730303031	h04	

(b) Response frame of XGT server

▷ In case of ACK response

Classification	Head	Station no.	Instruction	Instruction type	No. of block	No. of data	Data	No. of data	Data	Tail	Frame Check
Frame	ACK	01	R(r)	SS	02	02	1234	02	5678	ETX	BCC
Hex	h06	h3031	h52(72)	h5353	h3032	h3032	h31323334	h3032	h35363738	h03	

▷ In case of NAK response

Classification	Head	Station no.	Instruction	Instruction type	Error code	Tail	Frame check
Frame	NAK	01	R(r)	SS	Error code (2 byte)	ETX	BCC
Hex	h15	h3031	h52(72)	h5353	Error code (4 byte)	h03	

7.2.5 Writing the direct variable continuously (W(w)SB)

This function is used to write the data of the device continuously as long as specified from the specified address.

(1) Example of request frame that XGT client requests writing direct variable continuously.

Classification	Head	Station no.	Instruction	Instruction type	Variable Length	Variable Name	No. of data	Data	Tail	Frame Check
Frame	ENQ	10	W(w)	SB	06	%MW100	02	11112222	EOT	BCC
Hex	h05	h3130	h57(77)	h5342	h3036	h254D57313030	h3034	h3131313132323232	h04	

(2) Example of XGT server response

(a) In case of ACK response

Classification	Head	Station no.	Instruction	Instruction type	Tail	Frame Check
Frame	ACK	10	W(w)	SB	ETX	BCC
Hex	h06	h3130	h57(77)	h5342	h03	

(b) In case of NAK response

Classification	Head	Station no.	Instruction	Instruction type	Error code (Hex 2 byte)	Tail	Frame Check
Frame	ENQ	10	W(w)	SB	1132	ETX	BCC
Hex	h05	h3130	h57(77)	h5342	h31313332	h03	

(3) Meaning of each item

Classification	Description
Variable name	Start address of device to execute writing the direct variable continuously
No. of data	Number of data according to direct variable type Namely, if data type is word and no. of data is 5, it means to write 5 words. Max. no. of data is 120 byte in case of XEX, 240 byte in case of ASCII conversion.

(4) Example

Example that writes 2 bytes hAA15 at the D00001 of station number 1

(a) Request frame that XGT client requests writing direct variable continuously.

Classification	Head	Station no.	Instruction	Instruction type	Variable Length	Variable Name	No. of data	Data	Tail	Frame Check
Frame	ENQ	01	W(w)	SB	06	%DW000	01	AA15	EOT	BCC
Hex	h05	h3031	h57(77)	h5342	h3036	h2544573030	h3031	h41413135	h04	

(b) Response frame of XGT server

▷In case of ACK response

Format name	Head	Station no.	Instruction	Instruction type	Tail	Frame Check
Frame	ACK	01	W(w)	SB	ETX	BCC
Hex	h06	h3031	h57(77)	h5342	h03	

▷In case of NAK response

Format name	Head	Station no.	Instruction	Instruction type	Error code	Tail	Frame Check
Frame	NAK	01	W(w)	SB	Error code (2)	ETX	BCC
Hex	h15	h3031	h57(77)	h5342	Error code (4)	h03	

7.2.6 Reading direct variable continuously (R(r)SB)

This function is used to read the data of PLC device continuously as many as specified from the address.

(1) XGT client: Request frame to read continuous data

Classification	Head	Station no.	Instruction	Instruction type	Variable Length	Variable Name	No. of data (Max. 240 byte)	Tail	Frame Check
Frame	ENQ	10	R(r)	SB	06	%MW100	05	EOT	BCC
Hex	h05	h3130	h52(72)	h5342	h3036	h254D57313030	h3035	h04	

(2) XGT server: Response frame

(a) In case of ACK response

Classification	Head	Station no.	Instruction	Instruction type	No. of blocks	No. of data	Data	Tail	Frame Check
Frame	ACK	10	R(r)	SB	01	02	1122	ETX	BCC
Hex	h06	h3130	h52(72)	h5342	h3031	h3032	h31313232	h03	

(b) In case of NAK response

Classification	Head	Station no.	Instruction	Instruction type	Error code (Hex 2 byte)	Tail	Frame Check
Frame	NAK	10	R(r)	SB	1132	ETX	BCC
Hex	h15	h3130	h52(72)	h5342	h31313332	h03	

(3) Meaning of each item

<table>
<tr><th>Classification</th><th>Description</th></tr>
<tr><td>No. of data</td><td>▶It means no. of byte of Hex type and it is converted into ASCII
▶this number means number of byte.
<table>
<tr><th>Data type</th><th>Available direct variable</th><th>No. of data</th></tr>
<tr><td>Bit(X)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)X</td><td>1</td></tr>
<tr><td>Byte(B)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)B</td><td>1</td></tr>
<tr><td>Word(W)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)W</td><td>2</td></tr>
<tr><td>Dword(D)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)D</td><td>4</td></tr>
<tr><td>Lword(L)</td><td>%(P,M,L,K,F,T,C,I,Q,W,R)L</td><td>8</td></tr>
</table></td></tr>
<tr><td>Data</td><td>▶There is ASCII conversion value of Hex data in the data area.
▷Ex.1
If memory type of direct variable of request format is W(word) and no. of data is 03, no. of data of PLC ACK response is h06(2*03=06) and it is converted into ASCII code 3036.
▷Ex. 2
If contents of 3 words data is 1234, 5678, 9ABC in order, ASCII code conversion value is 31323334 35363738 39414243. In addition, this value is included in the data area.</td></tr>
</table>

(4) Example

Example that reads two words from M000 of station no. 10(h0A)
(We assume that the following data is included.)
M000 = h1234
M001 = h5678

(a) XGT client: Request frame to read continuously

Classification	Head	Station no.	Instruction	Instruction type	Variable Length	Variable Name	No. of data	Tail	Frame Check
Frame	ENQ	0A	R(r)	SB	06	%MW000	02	EOT	BCC
Hex	h05	h3041	h52(72)	h5342	h3036	h254D30 3030	h3032	h04	

(b) XGT server: response frame
▷In case of ACK response

Classification	Head	Station no.	Instruction	Instruction type	No. of data	Data	Tail	Frame Check
Frame	ACK	0A	R(r)	SB	04	12345678	ETX	BCC
Hex	h06	h3041	h52(72)	h5342	h3034	h3132333435363738	03	

▷In case of NAK response

Classification	Head	Station no.	Instruction	Instruction type	Error code	Tail	Frame Check
Frame	NAK	0A	R(r)	SB	Error code (2 byte)	ETX	BCC
Hex	h15	h3041	h52(72)	h5342	Error code (4 byte)	h03	

7.2.7 Registration and execution of monitor variable

(1) Registration of monitor variable (X##)

Monitor variables can be registered separately up to 32 (0 to 31) with Read instruction of actual variables through this function, which executes the registered details by monitor instruction after the registration.

(a) XGT client: frame to register monitor variable

Structure	Head	Station no.	Instruction	Registration no.	Registration format	Tail	Frame check
Frame	ENQ	01	X(x)	09	Refer to registration format	EOT	BCC
Hex	h05	h3031	h58(78)	h3039	Note 1)	h04	

(b) XGT server: response frame of monitor variable

▶In case of ACK response

Structure	Head	Station no.	Instruction	Registration no.	Tail	Frame check
Frame	ACK	01	X(x)	09	ETX	BCC
Hex	h06	h3031	h58(78)	h3039	h03	

▶In case of NAK response

Structure	Head	Station no.	Instruction	Registration no.	Error code (Hex 2 byte)	Tail	Frame check
Frame	NAK	01	X(x)	09	h1132	ETX	BCC
Hex	h15	h3031	h58(78)	h3039	h31313332	h03	

(c) Meaning of each item

Classification	Description
Registration no.	Up to 32 (0~31, H00~H1F) can be registered. If registered again with the already registered number, the presently executed one will be registered
Registration format	Available until EOT of instructions during format of reading single/continuous device

Note

Note 1) For registration format, select one among the following two formats.

▶Reading single device

RSS	No. of block (2 byte)	Variable length (2 byte)	Variable name (16 byte)	...

1 block (max. 16 block)

▶Reading continuous device

RSB	Variable length (2 byte)	Variable name (16 byte)	No. of data

(d) Example

Registers device M000 of station no. 1 as registration no. 01

1) XGT client: frame to register monitor variable

Classification	Head	Station no.	Instruction	Registration no.	Registration format				Tail	Frame check
					R##	No. of block	Variable length	Variable name		
Frame	ENQ	01	X(x)	01	RSS	01	06	%MW000	EOT	BCC
Hex	h05	h3031	h58(78)	h3031	h525353	h3031	h3036	h2554573030	h04	

2) XGT server: monitor variable response frame

▷In case of ACK response

Classification	Head	Station no.	Instruction	Registration no.	Tail	Frame check
Frame	ACK	01	X(x)	01	ETX	BCC
Hex	h06	h3031	h58(78)	h3031	h03	

▷In case of NAK response

Classification	Head	Station no.	Instruction	Registration no.	Error code	Tail	Frame check
Frame	NAK	01	X(x)	01	Error code (2)	ETX	BCC
Hex	h15	h3031	h58(78)	h3031	Error code (4)	h03	

(2) Execution of monitor (Y##)

This function is used to read the device registered by monitor registration. It specifies the registration number to read the device registered in that number.

(a) XGT client: frame to execute monitor

Classification	Head	Station no.	Instruction	Registration no.	Tail	Frame check
Frame	ENQ	10	Y(y)	09	EOT	BCC
Hex	h05	h3130	h59(79)	h3039	h03	

(b) XGT server: example of response frame about execution of monitor

1) In case of ACK response

▷In case that registration format of registration number is reading single device

Classification	Head	Station no.	Instruction	Registration no.	No. of block	No. of data	Data	Tail	Frame check
Frame	ACK	10	Y(y)	09	01	02	9183	ETX	BCC
Hex	h06	h3130	h59(79)	h3039	h3031	h3032	h39313833	h03	

▷ In case that registration format of registration number is reading continuous device

Classification	Head	Station no.	Instruction	Registration no.	No. of data	Data	Tail	Frame check
Frame	ACK	10	Y(y)	09	04	9183AABB	ETX	BCC
Hex	h06	h3130	h59(79)	h3039	h3034	h3931383341414242	h03	

2) In case of NAK response

Classification	Head	Station no.	Instruction	Registration no.	Error code (Hex 2 byte)	Tail	Frame check
Frame	NAK	10	Y(y)	09	1132	ETX	BCC
Hex	h15	h3130	h59(79)	h3039	h31313332	h03	

(c) Example

The device registered in No.01 of the station No.1 is to be read.

It is supposed that the registered device is the device M000 with one block

1) XGT client: frame to execute monitor

Classification	Head	Station no.	Instruction	Registration no.	Tail	Frame check
Frame	ENQ	01	Y(y)	01	EOT	BCC
Hex	h05	h3031	h59(79)	h3031	h04	

2) XGT server: response frame of execution of monitor

▷In case of ACK

Classification	Head	Station no.	Instruction	Registration no.	No. of block	No. of data	Data	Tail	Frame check
Frame	ACK	01	Y(y)	01	01	02	2342	ETX	BCC
Hex	h06	h3031	h59(79)	h3031	h3031	h3032	h32333432	h03	

▷In case of NAK

Classification	Head	Station no.	Instruction	Registration no.	Error code	Tail	Frame check
Frame	NAK	01	Y(y)	01	Error code (2)	ETX	BCC
Hex	h15	h3031	h59(79)	h3031	Error code (4)	h03	

7.2.8 Error code of XGT communication

If XGT client transmits the request frame to server, server analyzes the received frame. If frame is suited for XGT protocol, it transmits the ACK response frame and if frame is not suited for XGT protocol, it transmits the NAK response frame including the error code.
The following table describes the error code included in the NAK response.
Error code is displayed as hex 2 byte (4 byte as ASCII code). The user can see error by frame monitor and in case of viewing by ASCII, the user can see the following error code.

Error code	Error type	Error details and causes	Example
0003	Number of blocks exceeded	Number of blocks exceeds 16 at Individual Read/Write Request	01rSS1105%MW10…
0004	Variable length error	Variable Length exceeds the max. size of 16	01rSS010D%MW10000000000..
0007	Data type error	Other data type than X,B,W,D,L received	01rSS0105%MK10
0011	Data error	Data length area information incorrect	01rSB05%MW10%4
		In case % is unavailable to start with	01rSS0105$MW10
		Variable's area value wrong	01rSS0105%MW^&
		Other value is written for Bit Write than 00 or 01	01wSS0105%MX1011
0090	Monitor execution error	Unregistered monitor execution requested	
0190	Monitor execution error	Reg. No. range exceeded	
0290	Monitor reg. Error	Reg. No. range exceeded	
1132	Device memory error	Other letter than applicable device is input	
1232	Data size error	Request exceeds the max range of 60 Words to read or write at a time.	01wSB05%MW1040AA5512,..
1234	Extra frame error	Unnecessary details exist as added.	01rSS0105%MW10000
1332	Data type discordant	All the blocks shall be requested of the identical data type in the case of Individual Read/Write	01rSS0205%MW1005%MB10
1432	Data value error	Data value unavailable to convert to Hex	01wSS0105%MW10AA%5
7132	Variable request area exceeded	Request exceeds the area each device supports.	01rSS0108%MWFFFFF

7.3 XGT Communication Function

7.3.1 General

XGT communication acts as XGT server or P2P(XGT client) by setting of Cnet I/F module and each setting can be done by XG-PD.

(1) XGT server

(a) PC and peripheral device can read/write the inner information or data of PLC without special program.
(b) Responses to request frame from XGT client.

(2) P2P service

(a) Cnet I/F module acts as client in the network.
(b) If designated event occurs, client can read/write destination station's memory.
(c) 64 P2P blocks that act independently can be defined per one channel.

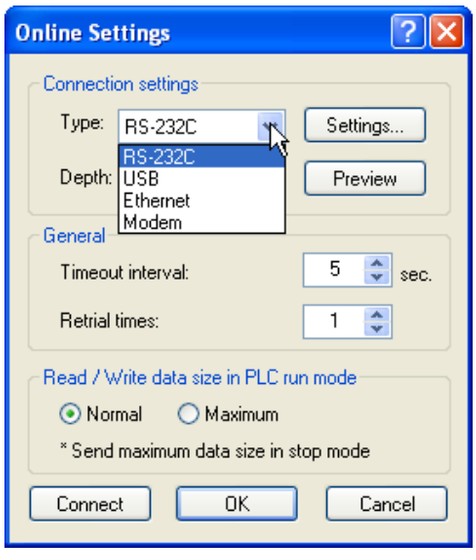
(3) Loader service

(a) It is available to download/upload the program/monitoring about remote PLC through remote 1, 2 connection.

7.3.2 Parameter setting when PLC acts as XGT server

(1) Connection setting

(a) Select [Online] -> [Connection Settings]
(b) Click Connect after setting



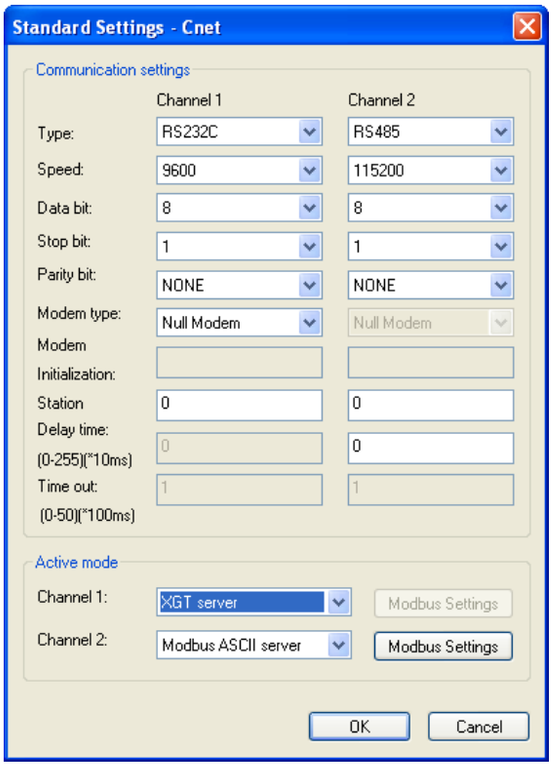
(2) Reading I/O information

Select [Online] - [Read I/O Information]
Reads the information about currently equipped module

(3) Standard settings

(a) Double-click the relevant Cnet I/F module and execute the standard setting window.
Set Type, Speed, Modem type, Data bit, Stop bit and Station.
(b) Modem initialization is activated when modem type is dial-up modem not null modem.

(c) Delay time is activated in case of RS422/485 and Time out is activated in case of P2P mode.



(4) Selecting active mode

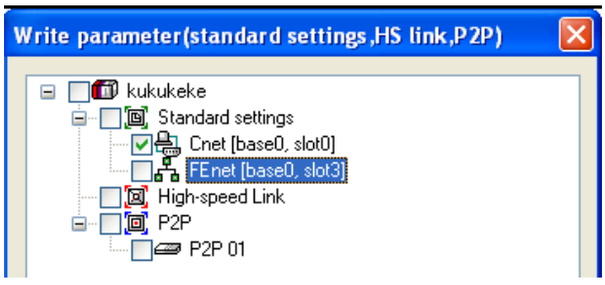
Select XGT server

(5) Writing parameter

(a) Select [Online] – [Write Parameter].

(b) Select the module to write and click OK.

(c) Reset the module.

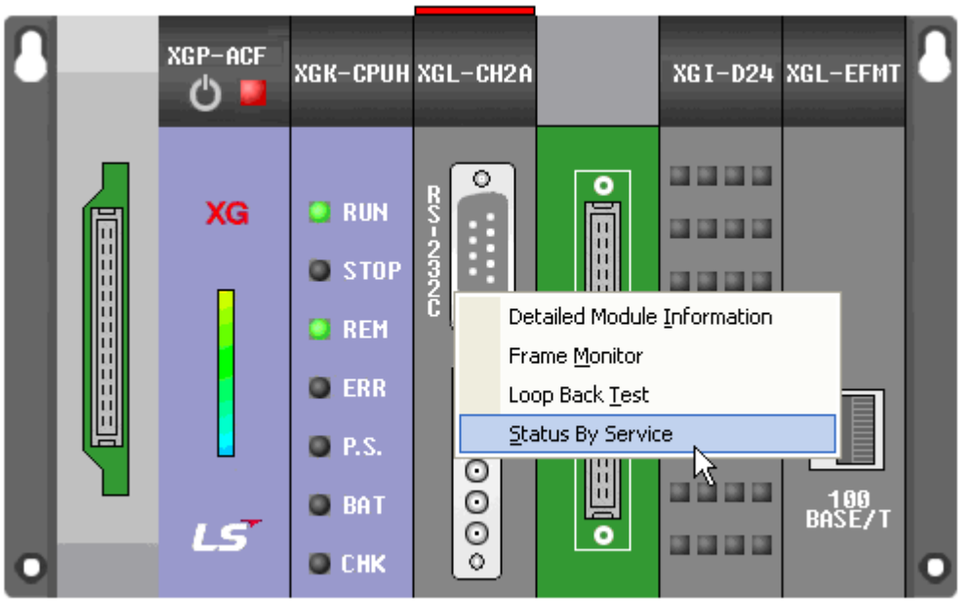


(6) Checking the operation

(a) Select [Online] - [System Diagnosis].

(b) Click the right button on the the relevant module and click Frame Monitor or Status By Service.

(c) For more information about 'Status By Service', refer to ch. 11.

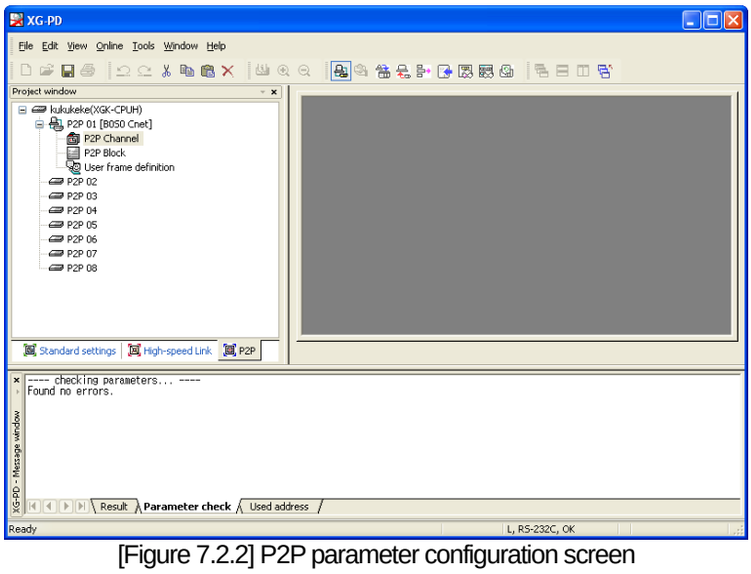


7.3.3 Parameter setting in case of XGT client

XGT client is executed by setting the P2P setting of XG-PD.

(1) 7.2.2 P2P parameter configuration

To use P2P service, the user should execute the setting in the P2P parameter window.
P2P parameter consists of three categories.



[Figure 7.2.2] P2P parameter configuration screen

(a) P2P Channel
1) Sets the P2P channel that defines the communication protocol of P2P service
2) Supported protocol: XGT/Modbus client, User definition frame
3) Each channel can have its own setting.
4) This is applied when active mode of standard setting is “Use P2P settings”

(b) P2P Block
1) Sets 64 P2P blocks that act independently

(c) User frame definition
1) Registers User defined frame

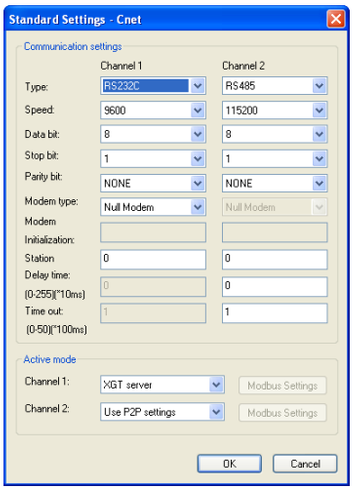
(d) P2P parameter setting window
1) Setting maximum eight P2P parameters is available.
2) Multiple P2P parameter setting for one Cent I/F module is available. However, Enable is available for one P2P parameter for one Cnet I/F module.
3) Each P2P parameter consists of P2P channel, P2P block, user frame definition

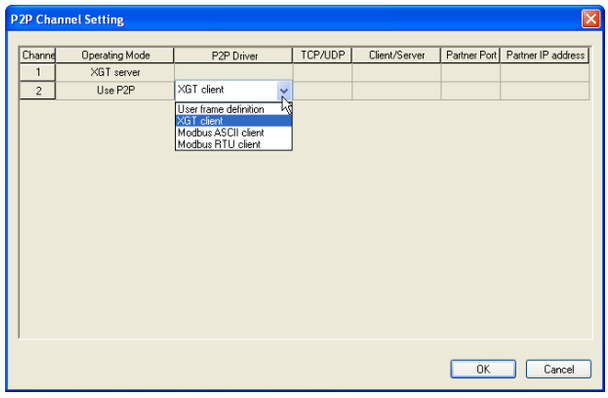
(e) P2P Edition window
1) It is available to register, edit max. 64 P2P blocks.

(2) Setting P2P channel

Cnet I/F module provides two communication port (channel 1, channel 2) that operates independently.
It is available to define driver type for P2P service about each channel. However, active mode in the standard settings should be set as “Use P2P settings”. P2P setting according to active mode is as follows.

(a) Active mode





In case that active mode is set as Use P2P settings, available driver and meaning is as follows.

Driver	Meaning
User frame definition	When transmitting/receiving the user defined frame
XGT client	When acting as XGT client
Modbus ASCII client	When acting as Modbus ASCII client
Modbus RTU client	When acting as Modbus RTU client

[Table 7.2.1] driver table

If P2P driver is set as XGT or Modbus, the user cannot use User frame definition.

(3) P2P block setting

If selecting P2P block in the P2P parameter setting window, P2P block setting window shows.
Block setting window is same according to protocol and activated area is different.

P2P Driver	P2P block setting
Channe: 1 / Operating Mode: Use P2P / P2P Driver: XGT client	Index: 0 / Ch.: 1 / Driver Setting: XGT client / P2P function / Conditional flag / Command type / Data type / No. of variable
Channe: 1 / Operating Mode: Use P2P / P2P Driver: Modbus ASCII client	Index: 0 / Ch.: 1 / Driver Setting: Modbus ASCII client / P2P function / Conditional flag / Command type / Data type / No. of variable: 1
Channe: 2 / Operating Mode: Use P2P / P2P Driver: Modbus RTU client	Index: 0 / Ch.: 2 / Driver Setting: Modbus RTU client / P2P function / Conditional flag / Command type / Data type / No. of variable: 1
Channe: 2 / Operating Mode: Use P2P / P2P Driver: User frame definition	Index: 0 / Ch.: 2 / Driver Setting: User frame definition / P2P function / Conditional flag / Command type / Data type / No. of variable

(4) Parameter setting when PLC acts as XGT server

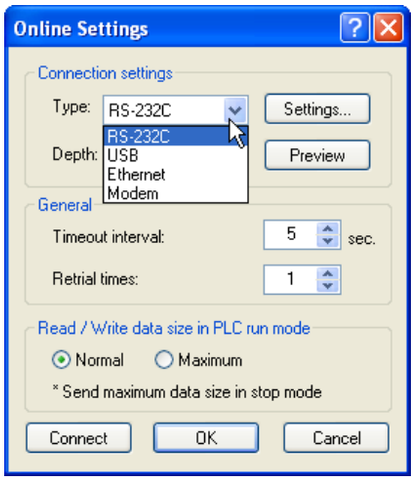
Operation of XGT client is divided into Read that executes reading the destination station's memory and Write that executes writing self-station's memory to destination station's memory.
Setting method is as follows.

(a) Setting the standard parameter

1) **Connection setting**

a) Select [Online]-[Connection settings]

b) After setting the connection option according to user, click the 'connection'.



2) **Reading IO information**

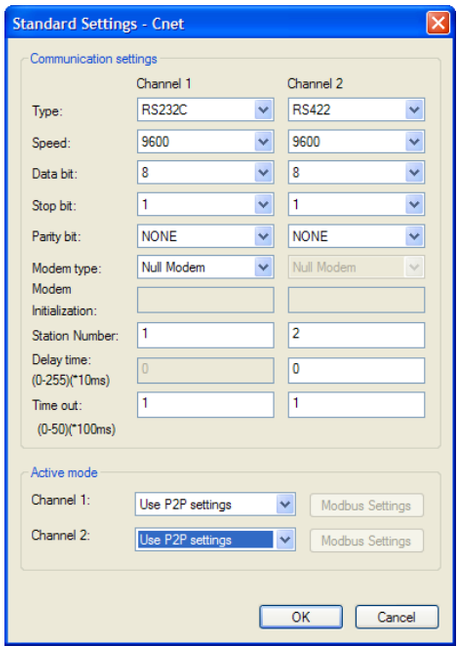
Select [Online]-[Read IO Information] and IO information of currently mounted is shown on the project window.

3) **Standard settings**

(a) Double-click the relevant Cnet I/F module and execute the standard settings window. Designate the communication type, speed, modem type, data bit, stop bit and station.

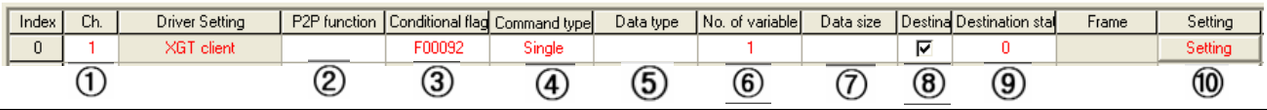
(b) Modem initialization is available in case of dial-up modem.

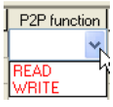
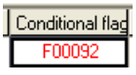
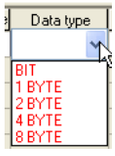
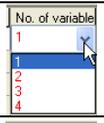
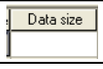
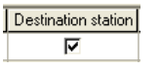
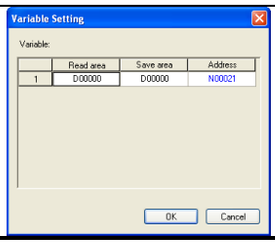
(c) Delay time setting is available in case of RS-422/485 and time out setting is available in case of RS-422/485 P2P mode.



4) **Selecting the active mode**
Select 'Use P2P settings' to act as XGT client.

(b) Setting P2P parameter



No.	Type	Block form	Contents
1	Channel		Driver name changes according to driver set in the P2P Driver.
2	P2P function		1. Read : when reading the destination station's memory 2. Write : when writing self-station's memory to destination station's memory.
3	Conditional flag		1. Determines when Cent sends request frame 2. In case of XGK type Ex. : F90(20ms flag), M01 3. In case of XGI type Ex. : _T20MS(20ms flag), %MX01
4	Command type		1. single: When reading/writing max. 4 memory areas. (Ex. : M01, M10, M20, M30) 2. continuous: When reading/writing continuous memory areas. (Ex. : M01~M10)
5	Data type		1. In case that command type is single: bit, 1 byte, 2byte, 4 byte, 8 byte available 2. In case that command type is continuous: 1 byte, 2byte, 4 byte, 8 byte
6	No. of variable		1. This is activated when command type is single and available max. no. is 4. 2. When command type is continuous, it is fixed as 1.
7	Data size		1. This is activated when command type is continuous. 2. When data type is 1 byte, available max. no. is 120 byte
8	Destination station		1. It is checked automatically. 2. In case that the user doesn't want to use relevant block, remove the check indication. Then that block doesn't work.
9	Destination station number		1. Destination station number, setting range is 0~31.
10	Setting		1. When P2P function is Read 1)Read area : device area of server 2)Save area : client's device to save the data from server 2. When P2P function is Write 1)Read area : device area of client 2)Save area : Server's device area to save client's data

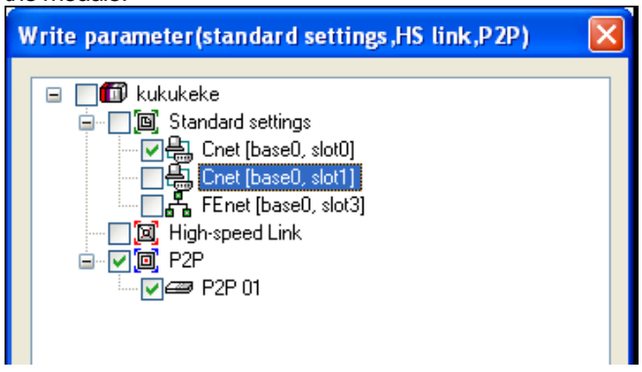
(c) **Writing the parameter**

1) Writing the parameter

a) Select [Online] – [Write Parameter]

b) Select the module in which parameter setting is completed.

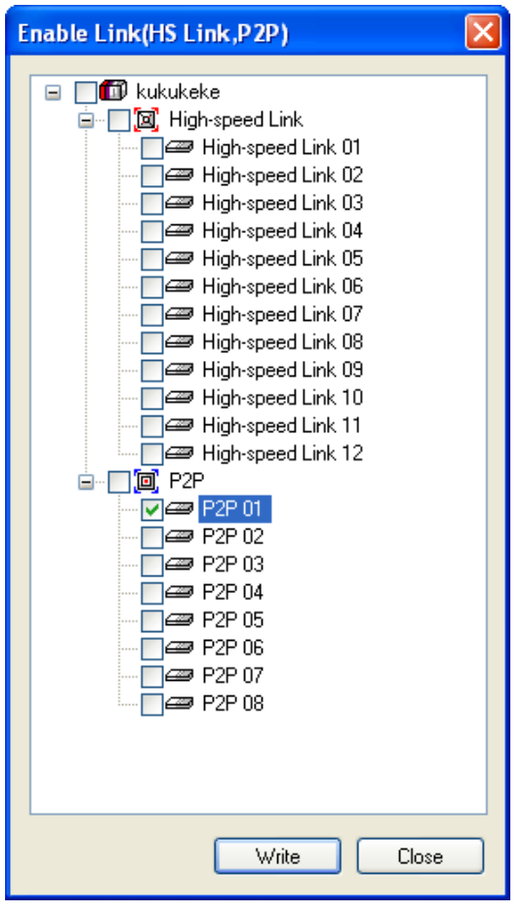
c) After writing, reset the module.



2) Enabling the link

a) Select [Online] – [Enable Link].

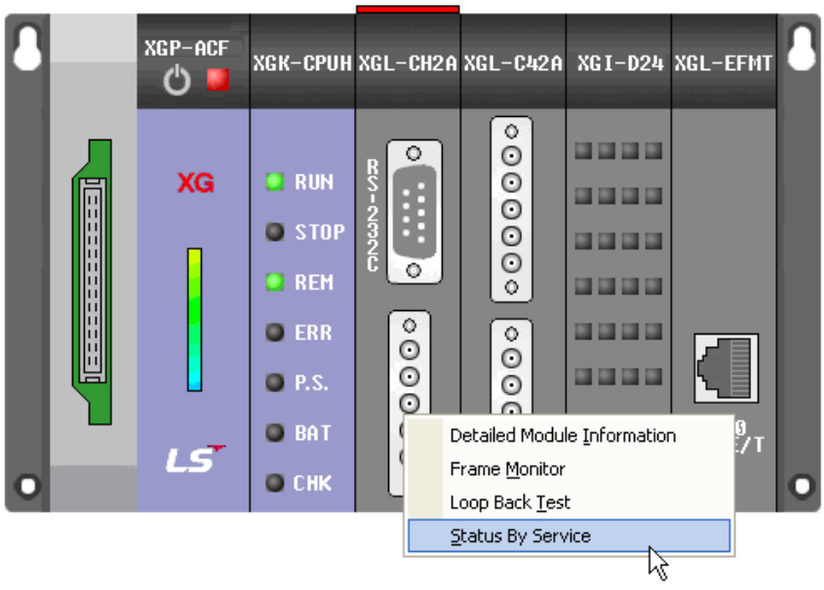
b) Click the P2P to enable and click Write.



3) **Checking the operation**

a) Select [Online] – [System Diagnosis].

b) Click the right button on the relevant module and click Frame Monitor or Status By Service.



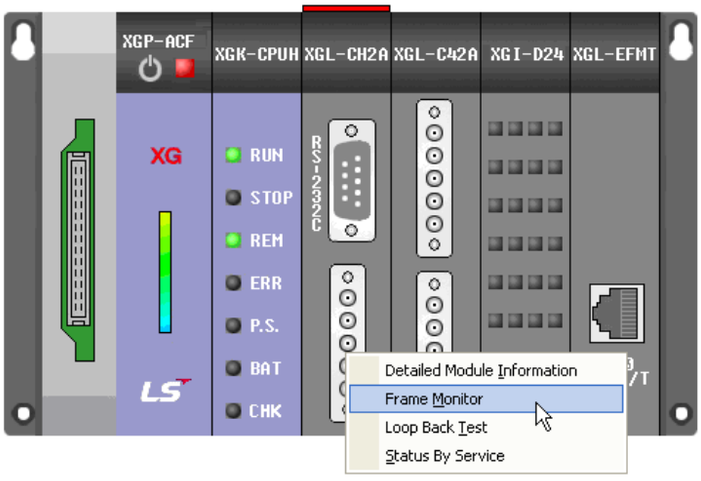
7.3.4 Frame monitor

The user can check the TRX frame of Cnet module by using the frame monitor.

(1) Checking the operation

(a) Select [Online] – [System Diagnosis].

(b) Click the right button on the relevant module and click Frame Monitor

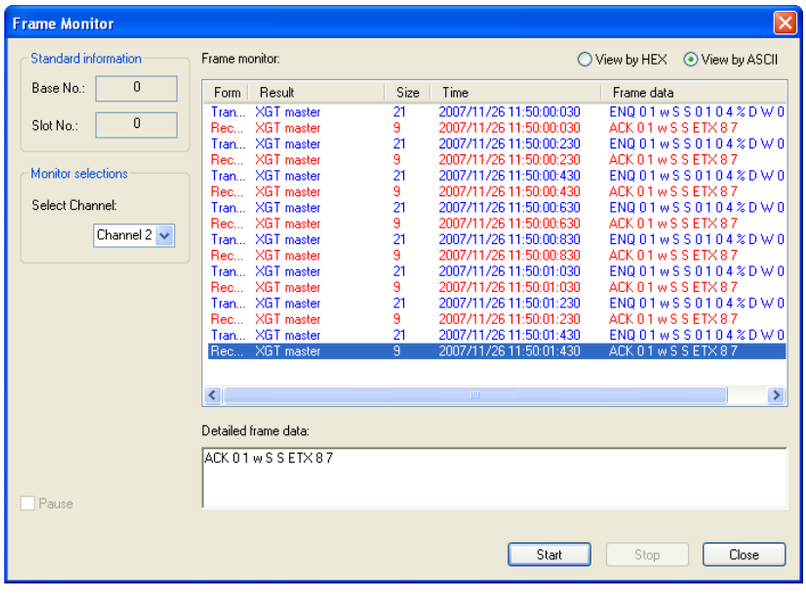


(2) Frame monitor

(a) Select channel to monitor.

(b) Since XGT protocol is ASCII communication, select View by ASCII

(c) Click Start.


Frame Monitor
Standard information
Base No.: 0
Slot No.: 0
Monitor selections
Select Channel:
Channel 2
Frame monitor:
View by HEX
View by ASCII
Form Result Size Time Frame data
Tran... XGT master 21 2007/11/26 11:50:00:030 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:030 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:230 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:230 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:430 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:430 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:630 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:630 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:830 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:830 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:01:030 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:01:030 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:01:230 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:01:230 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:01:430 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:01:430 ACK 0 1 w S S ETX 8 7
Detailed frame data:
ACK 0 1 w S S ETX 8 7
Pause
Start
Stop
Close

7.3.5 Example of parameter setting

(1) Example of parameter setting in case of XGT client

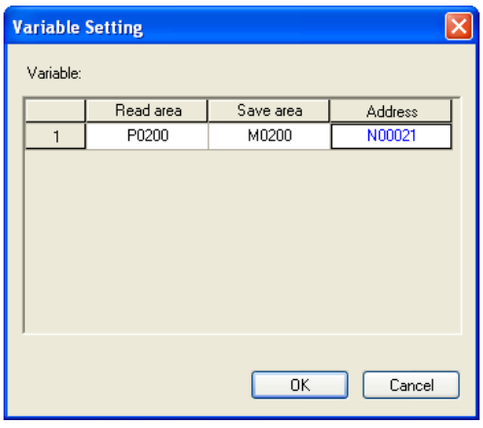
Client reads data of P0200 when M00001 is On and saves that 1 word data at the M200 of client.
In order to check whether data is transmitted normally or not, there are two methods (using XG-PD and XG-5000).

- XG-PD: analyzes the response frame through frame monitor
- XG-5000: executes [Monitor] – [Device Monitor] and checks the device memory

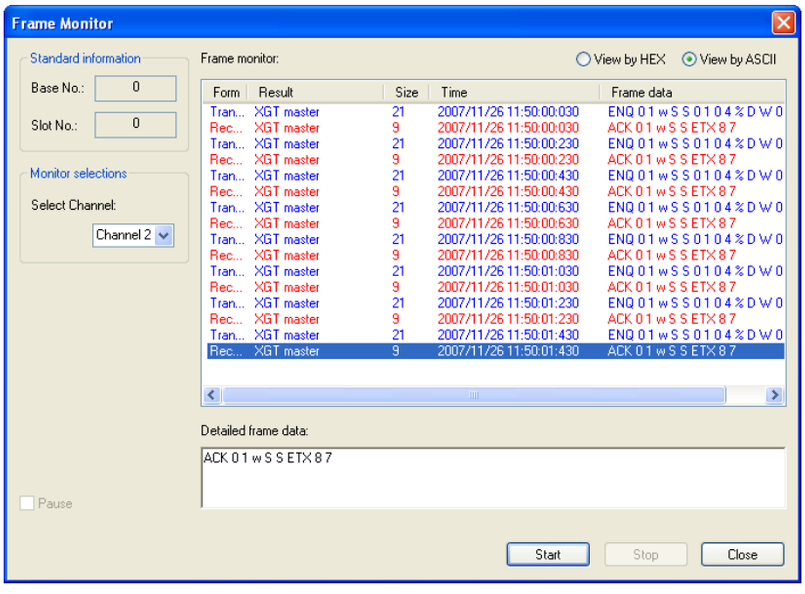
(a) Parameter setting contents

Index	Ch.	Driver Setting	P2P function	Conditional flag	Command type	Data type	No. of variable	Data size	Destina	Destination sta	Frame	Setting
0	1	XGT client	READ	M00001	Single	2 BYTE	1		☑	1		Setting
1												Setting

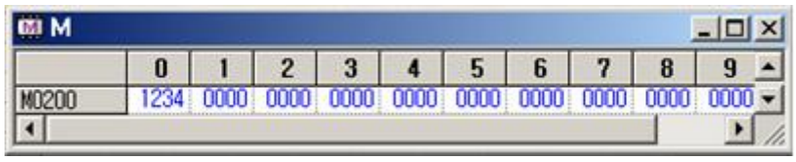
(b) Variable setting contents



(c) Result of monitoring


Frame Monitor
Standard information
Base No.: 0
Slot No.: 0
Monitor selections
Select Channel:
Channel 2
Pause
Frame monitor:
View by HEX
View by ASCII
Form Result Size Time Frame data
Tran... XGT master 21 2007/11/26 11:50:00:030 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:030 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:230 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:230 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:430 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:430 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:630 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:630 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:00:830 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:00:830 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:01:030 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:01:030 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:01:230 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:01:230 ACK 0 1 w S S ETX 8 7
Tran... XGT master 21 2007/11/26 11:50:01:430 ENQ 0 1 w S S 0 1 0 4 % D W 0
Rec... XGT master 9 2007/11/26 11:50:01:430 ACK 0 1 w S S ETX 8 7
Detailed frame data:
ACK 0 1 w S S ETX 8 7
Start
Stop
Close

(d) Device monitoring



7.4 Remote connection

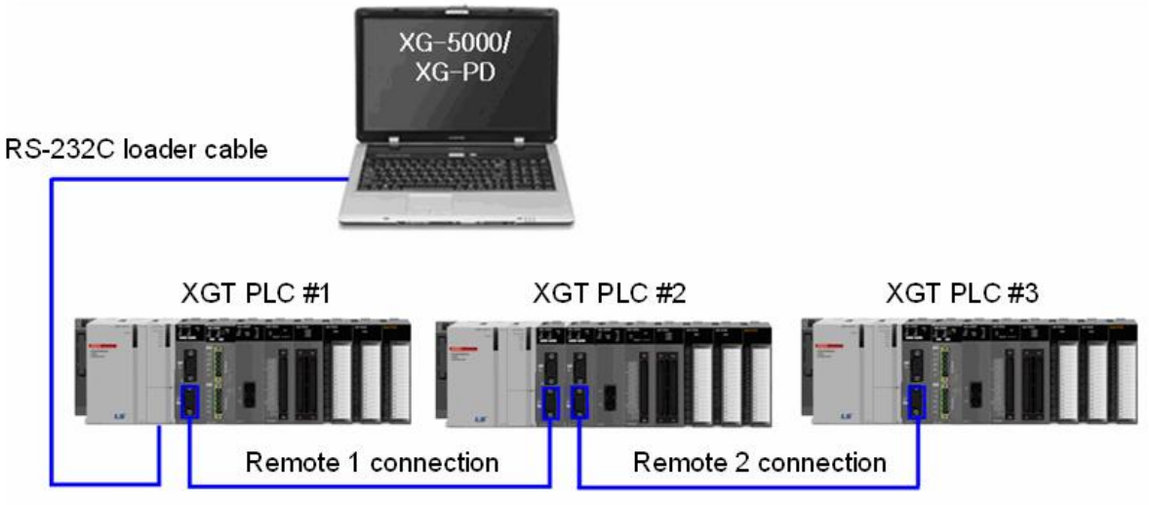
7.4.1 Summary of remote connection

If XG5000/XG-PD executed PC is located far from XGT-PLC, remote PLC program can be controlled for download, upload, debugging, monitoring, etc. through remote connection function of Cnet I/F module. Especially in case that XG5000 is located far away from PLC, PLC CPU can be conveniently accessible through remote function of XG5000 and XG – PD. The remote connection via Cnet module is available for both 2 cases of remote connection between Cnet modules where XG5000 and PLC are directly connected via RS-232C and modem connection between XG5000 and PLC. For information about remote connection through modem, refer to the Ch.7.4.

7.4.2 Limit of remote connection between Cnet I/F modules

Limit of remote connection between Cnet I/F modules is as follows.

(1) Communication type should be set as RS-232C, RS-422[note1)].
(2) In case of remote connection, maximum supported remote connection stage is two.
(3) Standard setting of Cnet I/F modules should be same for remote connection.
(4) In case of XGR, remote connection is available when station number of extension drive module is set within 1~15.



[Figure 7.4.1] Remote connection between Cnet I/F modules

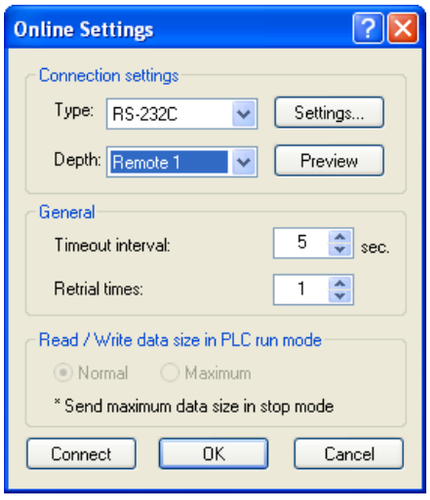
Note

Note1) Remote connection during communication between XGT Cnet I/F modules is supported when O/S version of XGT Cnet I/F module is 2.5 or above. Features are as follows.
(1) For communication type, only RS-232C, RS-422 method is supported. In case of remote connection using RS-485, remote connection is only available when the P2P link on the online menu of XG-PD is disabled.
(2) Remote connection is supported regardless of active mode.
(3) Remote connection during communication is affected according to TRX period and an amount of data
- In case TRX period is short or amount of data is huge, disconnection may occur.

7.4.3 Remote 1 connection

This is used in the system like [Figure 7.3.1] and connection method is as follows.

(1) Click 'Connection settings' and set Depth as Remote 1



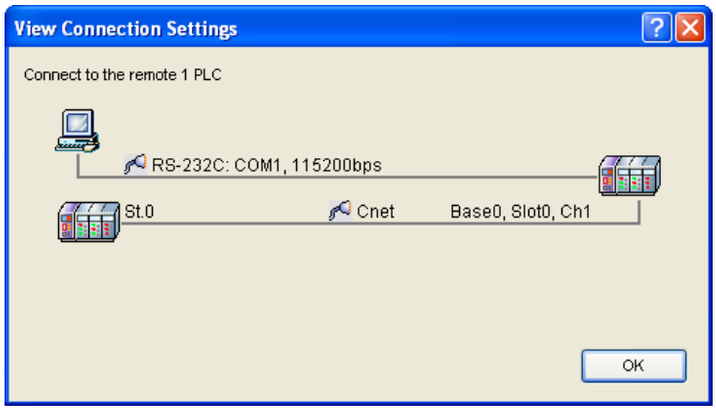
(a) General

1) Timeout interval: when trying to connect PLC, if response doesn't come within Timeout interval, XG5000 considers connection trial as timeout, connection fail.
2) Retrial: in case of connection fail, it retry as many as retrial times.

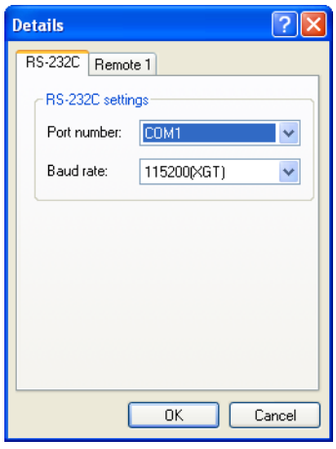
(b) Connection option setting

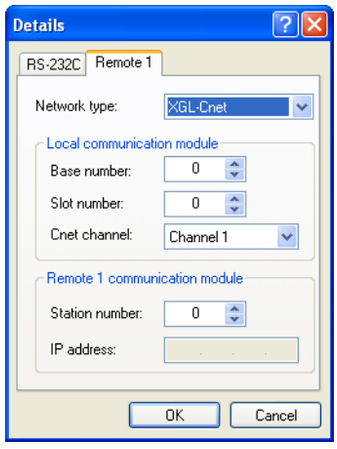
1) Preview

The following figure is system configuration in case of remote 1 connection.



2) Click [Setting…] and set details of RS-232C and remote connection 1





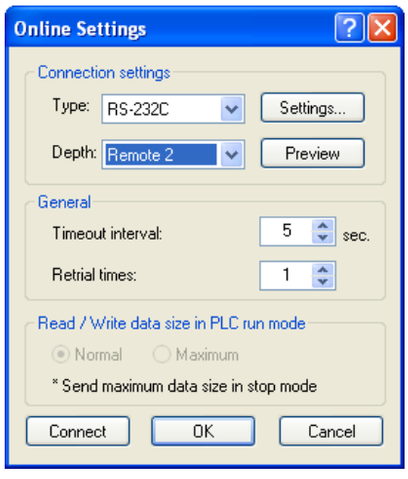
3) Details of RS-232C
   a) Port number: port of computer where XG5000 or XG-PD is installed.
   b) Baud rate: supports 38400 and 115200 bps.

4) Details of remote 1
   a) Network type: means communication module executing remote connection and select XGT-Cnet.
   b) Local communication module: set base number, slot number and channel of local Cnet I/F module.
   c) Remote 1 communication module: select station number of Cnet I/F module executing remote connection.

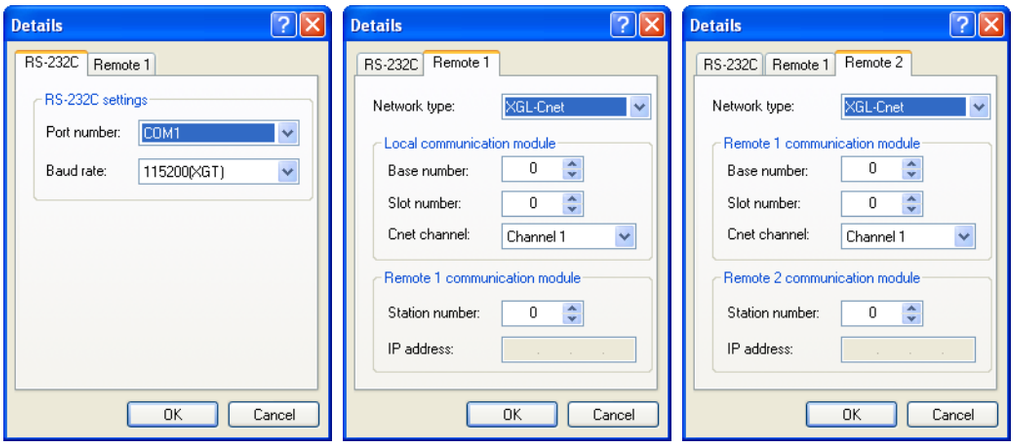
(c) Click Connect after setting of details

7.4.4 Remote 2 connection

(1) Click Connection settings and select Depth as Remote 2.



(2) Click Connection settings and set details of remote 1 connection



(a) Details of RS-232C

1) Port number: Computer port number where XG-5000 or XG-PD installed
2) Baud rate: supports 38400, 115200 bps

(b) Details of remote 1

1) Network type: means communication module executing remote connection and select XGT-Cnet.
2) Local communication module: set base number, slot number and channel of local Cnet I/F module.
3) Remote 1 communication module: select station number of Cnet I/F module executing remote connection.

(c) Details of remote 2

1) Network type: means communication module executing remote connection and select XGT-Cnet.
2) Remote 1 communication module: set base number, slot number and channel of remote 1 Cnet I/F module.
3) Remote 2 communication module: select station number of Cnet I/F module executing remote 2 connection.

(3) After completing the setting of details, click Connect.

7.5 Modem Communication

7.5.1 Summary

When using RS-232C and RS 422/485, because of characteristic of communication type, communication length is limited (RS-232C: 15m, RS 422/485: 500m). If Modem and Cnet module is used, control of remote PLC is possible.

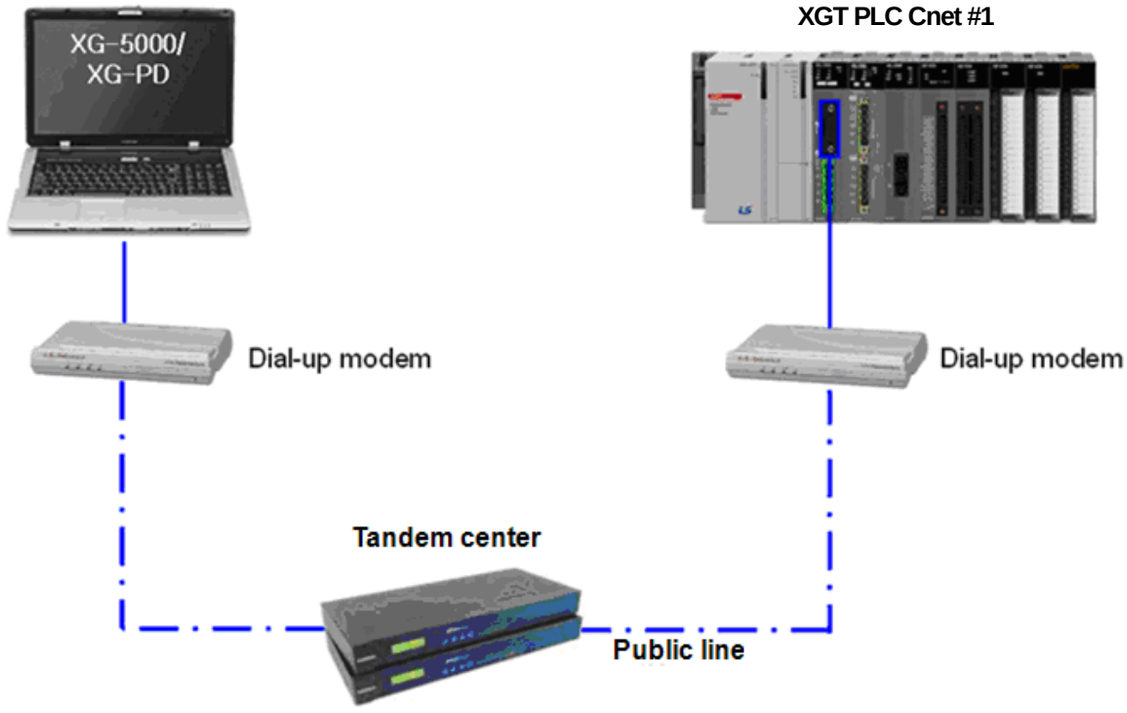
7.5.2 Remote connection through modem

[Figure 7.5.1] is example of remote connection between PC (XG5000 or XG-PD) and PLC by modem. That configuration is necessary when connecting PC with remote PLC through telephone line, dedicated modem or wireless modem. At this time, set communication type on the communication settings as modem.

There are two methods for connection by modem (dedicated modem, which uses dedicated line, and dial-up modem, which uses airline).

(1) Connection method by modem

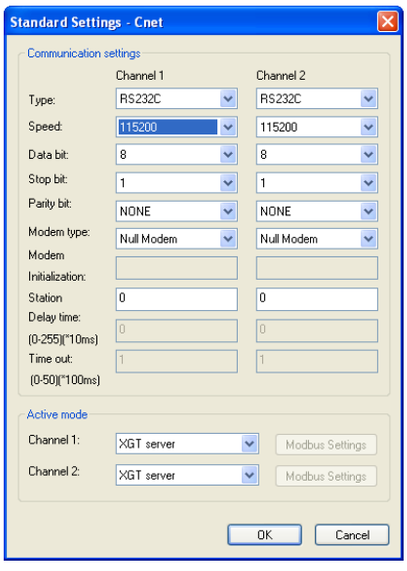
[Figure 7.5.1] is connection example through dial-up modem. Dial-up modem connection is modem connection that uses remote connection adding making phone call and hanging up phone call. Namely, XG5000 makes phone call and after connection of phone, remote connection is executed. PC can use external modem and internal dial-up modem. Cnet I/F module uses the external modem.



[Figure 7.5.1] Example of XG5000 remote connection through dial-up modem

Procedure of remote connection through modem is as follows.

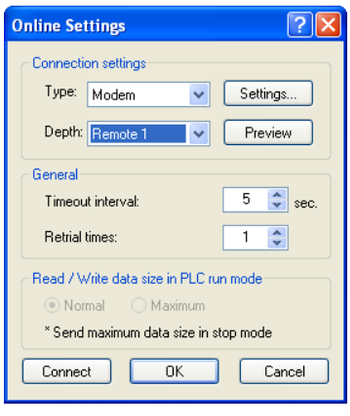
(a) Set active mode of RS-232C as XGT server.



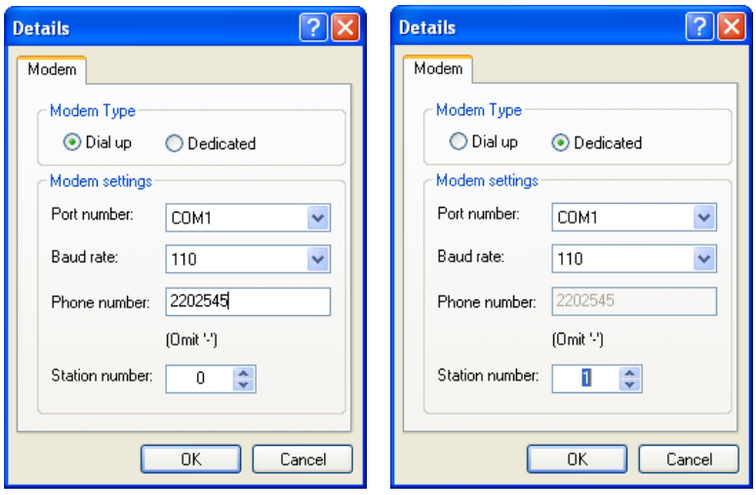
1) Modem type
   a) Dial-up: when using the airline, select dial-up modem.
   b) Dedicated: when using the dedicated line, select dedicated modem.

2) Modem Initialization
   Input command to initialize the modem. Since command for modem initialization is different according to maker, refer to the maker's manual.

(b) Set modem type as dial-up modem and input command for modem initialization.
(c) Execute XG5000 or XG-PD and select [Online]-[Connection Settings].
   At this setting window, set Type as Modem.



(d) Click Settings… and set details of modem.



1) Modem
   a) Dial-up
      When using the public line, select Dial up.
   b) Dedicated
      When not using the public line, select Dedicated.

2) Modem settings
   a) Port number
      Indicates communication port of modem
   b) Baud rate
      Modem's communication speed
   c) Phone number
      Input destination modem's phone number. When output signal from modem that request making phone call is using extension line, the user can use extension line number and ',' symbol.

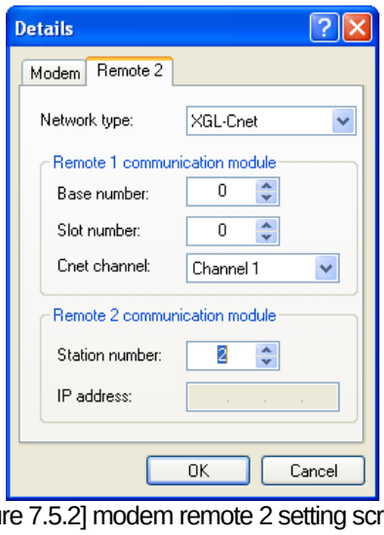
      Ex.) In case that extension line number is '9': set as 9, 0343-398-xxxx

Note

1) If received part has extension line number, dial-up modem communication is impossible.

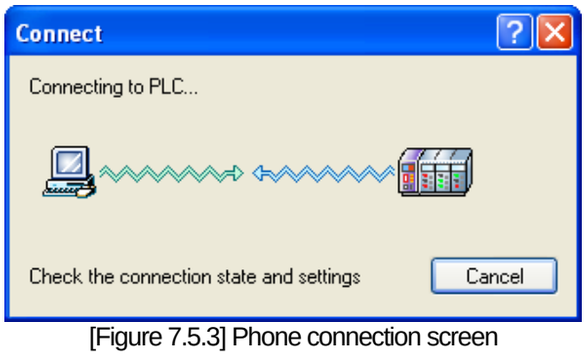
   d) Station number
      Indicates destination's station number

   e) In case of remote 2 connection, select base and slot number of remote 1 communication module and select station number of remote 2 communication module. Input station number set in the Cnet module. In case of Cnet channel, select communication channel of remote 2.



[Figure 7.5.2] modem remote 2 setting screen

(f) After setting the connection settings, click Connect.



[Figure 7.5.3] Phone connection screen

(g) If setting of modem COM channel is abnormal or connection is abnormal, the following error message is invoked. At this time, check COM channel or connection of modem.

[Figure 7.5.4] Error message when connecting

(h) If making phone call is completed, XG5000 remote connection is tried automatically. If remote connection is completed, icon of Run Stop is activated.
(i) This status is same with local connection through RS-232C cable and the user can use all of online menu.
(j) When disconnecting, select [Online]-[Disconnect].
(k) If disconnection is done, XG5000 executes hanging up telephone call automatically.
(l) If hanging up is done normally, local and remote modem is initialized and can execute making phone call.

Note

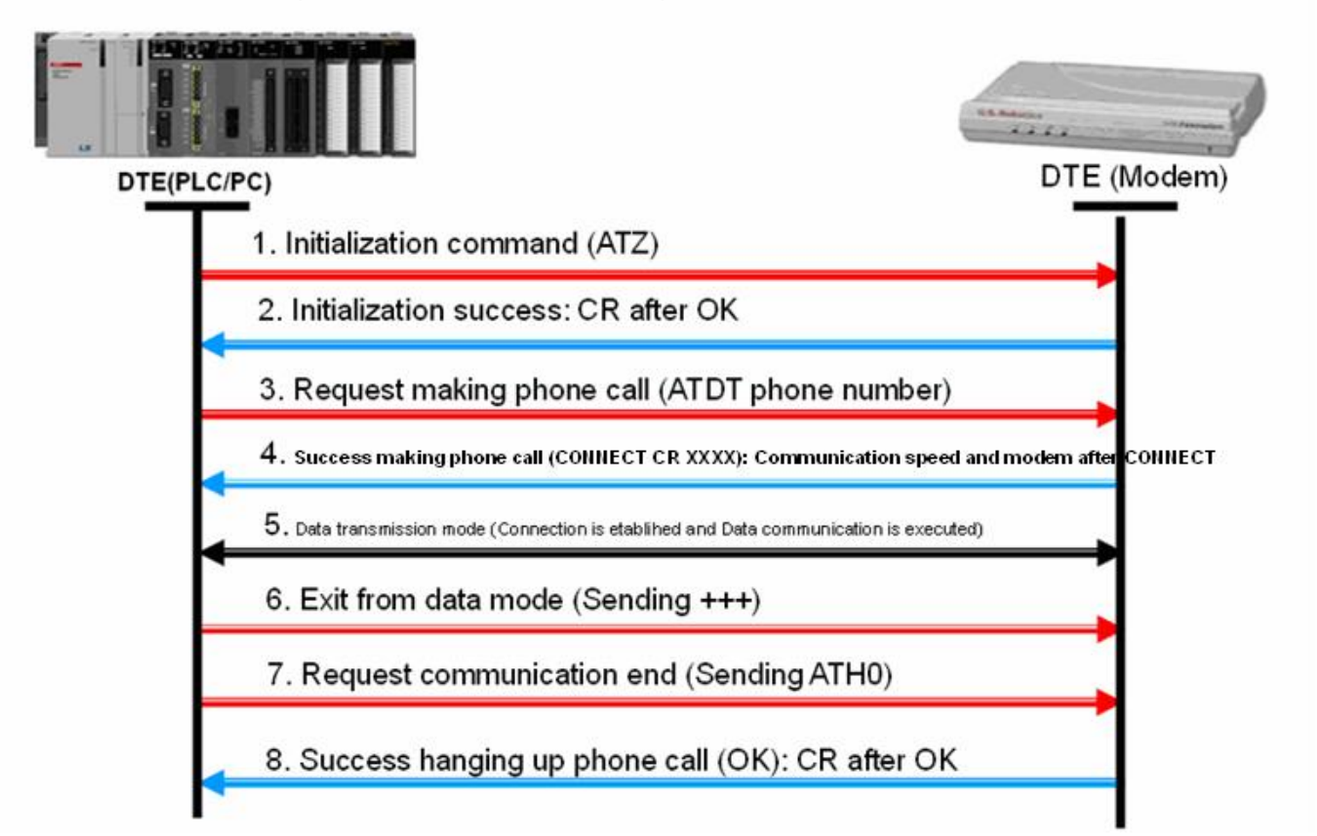
1) Baud rate is communication speed between PC and modem. Modem communication speed means communication speed between modem and other modem and it is determined automatically according to quality of airline and partner modem's speed.

2) XG5000 remote connection should use RS-232C channel. Set 'RS-232C dial-up modem and write it to XGT Cnet I/F module and reset the module. Other setting is same.

3) After remote connection, the user can use the online menu like local connection. (download/upload/monitor etc.) PLC control through modem is affected by quality of modem and condition of telephone line. If condition of telephone line is bad, connection is disconnected. At this time, don't try re-connection. Wait about 30s and retry.

7.5.3 Communication procedure between PLC and dial up modem

Communication procedure between PLC and dial up modem is as follows.


DTE(PLC/PC)
DTE (Modem)
1. Initialization command (ATZ)
2. Initialization success: CR after OK
3. Request making phone call (ATDT phone number)
4. Success making phone call (CONNECT CR XXXX): Communication speed and modem after CONNECT
5. Data transmission mode (Connection is etablihed and Data communication is executed)
6. Exit from data mode (Sending +++)
7. Request communication end (Sending ATH0)
8. Success hanging up phone call (OK): CR after OK

Note

(1) Initial command of dial-up modem may be different according to producer. When using communication by using modem, refer to manual of modem.

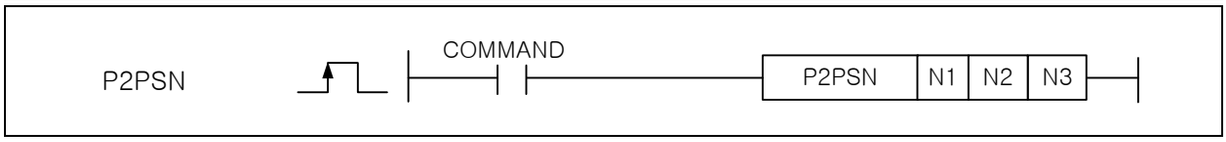
7.6 Communication Command

7.6.1 XGK command

Applicable	
XGI	XGR
O	O

(1) P2PSN

command		Available area													Step	Flag		
		PMK	F	L	T	C	S	Z	D.x	R.x	Constant	U	N	D	R		Error (F110)	Zero (F111)	Carry (F112)
P2PSN	N1	O	-	O	O	O	-	O	-	-	O	O	O	O	O	4~6	O	-	-
	N2	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N3	O	-	O	O	O	-	O	-	-	O	O	O	O	O				



(a) Area setting

Operand	Setting	Data size
N1	P2P number (1 ~8)	Word
N2	Block number (0 ~ 63)	Word
N3	Station number (0 ~ 63)	Word

(b) Flag set

Flag	Contents	Device number
Error	When N1, N2, N3 exceeds the range.	F110

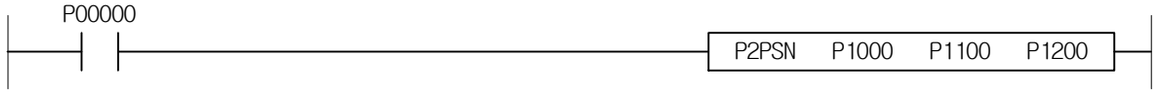
(c) Function

1) By using the P2PSN instruction, the user can change destination station number of P2P service during RUN.
2) Changes destination station number of block index N2 of P2P N1 into N3
3) Applicable communication module: FDEnet, Cnet

(d) Error

If each parameter exceeds the range (N1(1~8), N2(0~63), N3(0~63)), it sets the error flag (F110).

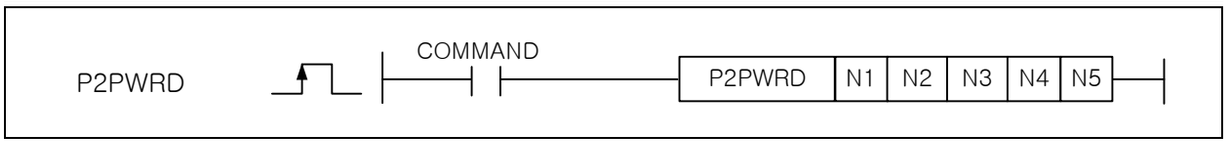
(e) Program example



(2) P2PWRD

Applicable	
XGI	XGR
O	O

Command		Available area														Step	Flag		
		PMK		Error (F110)		Error (F110)	S	Z	D.x	R.x	Constant	U	N	D	R		Error (F110)	Zero (F111)	Carry (F112)
P2PWRD	N1	O	-	O	O	O	-	O	-	-	O	O	O	O	O	4~6	O	-	-
	N2	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N3	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N4	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N5	O	-	O	O	O	-	O	-	-	-	O	O	O	O				



(a) Area setting

Operand	Description	Data size
N1	P2P number (1 ~ 8)	Word
N2	Block number (0 ~ 63)	Word
N3	Variable number (1 ~ 4)	Word
N4	Variable size [n byte] (0 ~ 1400)	Word
N5	Device	Word

(b) Flag set

Flag	Contents	Device number
Error	When N1, N2, N3, N4 exceeds the range.	F110

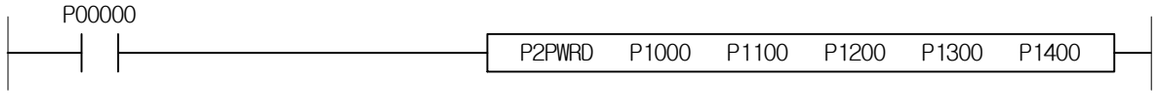
(c) Function

1) P2PWRD instruction changes variable size of P2P parameter block and destination station's device area to read a word device.
2) After selecting P2P parameter, block, and variable by using N1, N2, N3, it changes the variable size and device into N4, N5.
3) Applicable communication module: FEnet, FDEnet, Cnet

(d) Error

If each parameter exceeds the range (N1(1~8), N2(0~63), N3(1~4), N4(0~1400)), it sets the error flag (F110).

(e) Program example



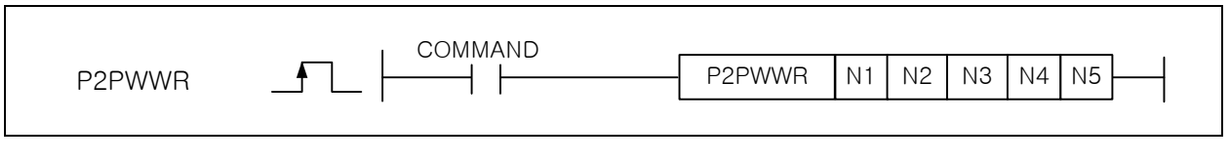
Note

1) When command type is single, N3 uses 1~4 and N4 doesn't have a meaning.
2) When command type is continuous, N3 always uses 1 and N4 is applied.
3) Variable size (N4) uses byte unit.

Applicable	
XGI	XGR
O	O

(3) P2PWWR

command		Available area													Step	Flag		
		PMK	F	Error (F110)	Error (F110)	Error (F110)	S	Z	D.x	R.x	Constant	U	N	D	R		Error (F110)	Zero (F111)	Carry (F112)
P2PWWR	N1	O	-	O	O	O	-	O	-	-	O	O	O	O	O	4~6	O	-	-
	N2	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N3	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N4	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N5	O	-	O	O	O	-	O	-	-		O	O	O	O				



(a) Area setting

Operand	Description	Data size
N1	P2P number (1 ~ 8)	word
N2	Block number (0 ~ 63)	word
N3	Variable number (1 ~ 4)	word
N4	Variable size (0 ~ 1400)	word
N5	Device	word

(b) Flag set

Flag	Contents	Device number
error	When N1, N2, N3, N4 exceeds the range.	F110

(c) Function

1) P2PWWR instruction changes variable size of P2P parameter block and destination station's device area to write a word device.

2) After selecting P2P parameter, block, and variable by using N1, N2, N3, it changes the variable size and device into N4, N5.

3) Applicable communication module: FEnet, FDEnet, Cnet

(d) Error

If each parameter exceeds the range (N1(1~8), N2(0~63), N3(1~4), N4(0~1400)), it sets the error flag (F110).

(e) Program example

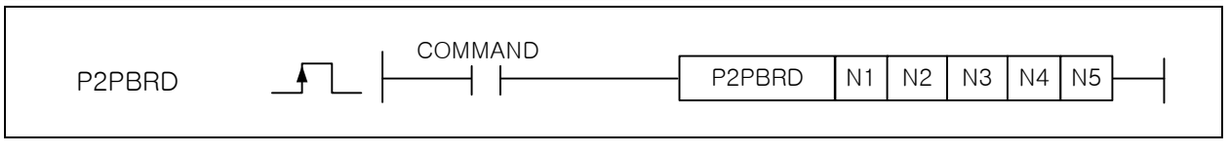
Note

1) When command type is single, N3 uses 1~4 and N4 doesn't have a meaning.
2) When command type is continuous, N3 always uses 1 and N4 is applied.
3) Variable size (N4) uses byte unit.

Applicable	
XGI	XGR
O	O

(4) P2PBRD

command		Available area														Step	Flag		
		PMK	F	L	T	C	S	Z	D.x	R.x	Constant	U	N	D	R		Error (F110)	Zero (F111)	Carry (F112)
P2PBRD	N1	O	-	O	O	O	-	O	-	-	O	O	O	O	O	4~6	O	-	-
	N2	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N3	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N4	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N5	O	-	O	O	O	-	-	O	O	-	O	-	-	-				



(a) Area setting

Operand	Description	Data size
N1	P2P number (1 ~ 8)	word
N2	Block number (0 ~ 63)	word
N3	Variable number (1 ~ 4)	word
N4	Variable size (0 ~ 2000)	word
N5	Device	word

(b) Flag set

Flag	Contents	Device number
error	When N1, N2, N3, N4 exceeds the range.	F110

(c) Function

1) P2PBRD instruction changes variable size of P2P parameter block and destination station's device area to read a bit device.
2) After selecting P2P parameter, block, and variable by using N1, N2, N3, it changes the variable size and device into N4, N5.
3) Applicable communication module: FEnet, FDEnet, Cnet

(d) Error

If each parameter exceeds the range (N1(1~8), N2(0~63), N3(1~4), N4(0~1400)), it sets the error flag (F110).

(e) Program example

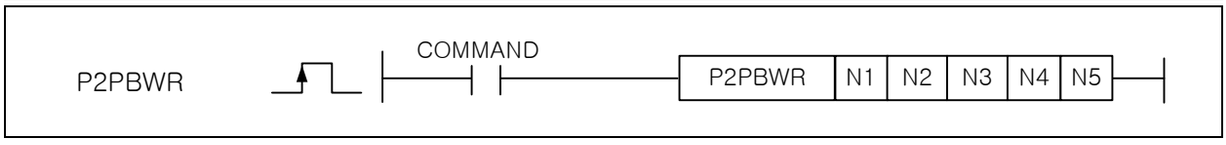
Note

1) When command type is single, N3 uses 1~4 and N4 doesn't have a meaning.
2) When command type is continuous, N3 always uses 1 and N4 is applied.
3) Variable size (N4) uses byte unit.

Applicable	
XGI	XGR
O	O

(5) P2PBWR

command		Available area														Step	Flag		
		PMK	F	L	T	C	S	Z	D.x	R.x	Constant	U	N	D	R		Error (F110)	Zero (F111)	Carry (F112)
P2PBWR	N1	O	-	O	O	O	-	O	-	-	O	O	O	O	O	4~6	O	-	-
	N2	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N3	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N4	O	-	O	O	O	-	O	-	-	O	O	O	O	O				
	N5	O	-	O	O	O	-	-	O	O	-	O	-	-	-				



(a) Area setting

Operand	Description	Data size
N1	P2P number (1 ~ 8)	word
N2	Block number (0 ~ 63)	word
N3	Variable number (1 ~ 4)	word
N4	Variable size (0 ~ 2000)	word
N5	Device	word

(b) Flag set

Flag	Contents	Device number
error	When N1, N2, N3, N4 exceeds the range.	F110

(c) Function

1) P2PBWR instruction changes variable size of P2P parameter block and destination station's device area to write a bit device.
2) After selecting P2P parameter, block, and variable by using N1, N2, N3, it changes the variable size and device into N4, N5.
3) Applicable communication module: FEnet, FDEnet, Cnet

(d) Error

If each parameter exceeds the range (N1(1~8), N2(0~63), N3(1~4), N4(0~1400)), it sets the error flag (F110).

(E) Program example

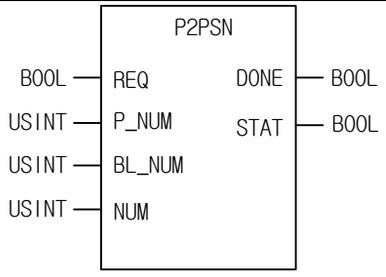
Note

1) When command type is single, N3 uses 1~4 and N4 doesn't have a meaning.
2) When command type is continuous, N3 always uses 1 and N4 is applied.
3) Variable size (N4) uses byte unit.

Applicable	
XGI	XGR
O	O

7.6.2 XGI command

(1) P2PSN

Function block	Description
	Input REQ : requests function block execution P_NUM : P2P number BL_NUM : block number NUM : station number output DONE : Keeping 1 after first operation STAT : Information about error

(a) Function

1) By using the P2PSN instruction, the user can change destination station number of P2P service during RUN.

2) Changes destination station number of block index BL_NUM of P2P P_NUM into NUM

Applicable communication module: FDEnet, Cnet

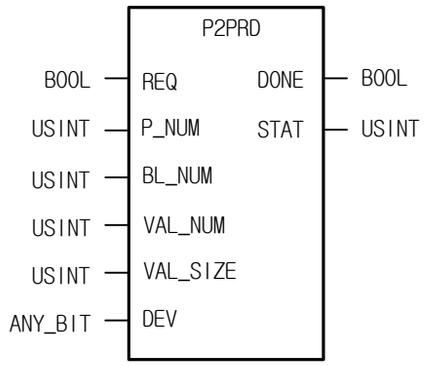
(b) Error

In case of error, Error code is displayed in STAT.

STAT_NUM	Contents	Detail description
1	P2P number setting	P_NUM is not proper value(1~8)
2	Block number setting	BL_NUM(0~63) is not proper value(0~31)
4	There is no designated slot	-
5	Module mismatch	Not communication module
6	Module mismatch	Communication module can't use this command

Applicable	
XGI	XGR
O	O

(2) P2PRD

Function block	Description
	Input REQ : requests function block execution P_NUM : P2P number BL_NUM : block number VAL_NUM : Variable number VAL_SIZE : Variable size DEV : Device (Only direct variable) Output DONE : Keeping 1 after first operation STAT : Information about error

ANY type Variable description	Variable name	BOOL	BYTE	WORD	DWORD	LWORD	SINT	INT	DINT	LINT	USINT	UINT	UDINT	ULINT	REAL	LREAL	TIME	DATE	TOD	DT	STRING
	DEV	○	○	○	○	○															

(a) Function

1) Changes variable size of P2P parameter block and destination station's device area to read (Command type Single and Continuous are available.)

2) After designating P2P parameter, block and variable by using P_NUM, BL_NUM, VAL_NUM, it changes the variable size and device to VAL_SIZE(if continuous, VAL_SIZE means variable size and if individual, it means the size of variable type), where DEV can be input only for a direct variable(ex, %MW100).

Communication modules: FEnet, FDEnet, Cnet

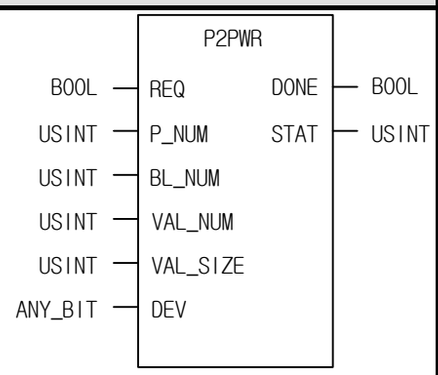
(b) Error

1) If it is out of the allowable scope of P2P parameter set in XG-PD, the error number occurs as follows.

STAT_NUM	Message	Description
1	P2P number setting error	If a value except P_NUM(1~8) is set
2	Block number setting error	If a value except BL_NUM(0~63) is set < In case of Cnet, 0~31 >
3	Variable number setting error	If a variable number not allowed in P2P parameter set in XG-PD is input
4	No slot	-
5	Module inconsistency	No communication module
6	Module inconsistency	Communication module not available in the instruction
10	MODBUS setting error	MODBUS offset can not be input(ex, h10000). Because DEV can be input only for a direct variable
11	Variable size setting error	If a variable size not allowed in P2P parameter set in XG-PD is input
12	Data type setting error	If a variable type not allowed in P2P parameter set in XG-PD is input

Applicable	
XGI	XGR
O	O

(3) P2PWR

Function block	Description
	Input REQ : requests function block execution P_NUM : P2P number BL_NUM : block number VAL_NUM : Variable number VAL_SIZE : Variable size DEV : Device (Only direct variable) Output DONE : Keeping 1 after first operation STAT : Information about error

ANY type Variable description	Variable name	BOOL	BYTE	WORD	DWORD	LWORD	SINT	INT	DINT	LINT	USINT	UINT	UDINT	ULINT	REAL	LREAL	TIME	DATE	TOD	DT	STRING
	DEV	○	○	○	○	○															

(a) Function

1) Changes variable size of P2P parameter block and destination station's device area to write (Command type Single and Continuous are available.)

2) After designating P2P parameter, block and variable by using P_NUM, BL_NUM, VAL_NUM, it changes the variable size and device to VAL_SIZE(if continuous, VAL_SIZE means variable size and if individual, it means the size of variable type), where DEV can be input only for a direct variable(ex, %MW100).

Communication modules: FEnet, FDEnet, Cnet

(b) Error

1) If it is out of the allowable scope of P2P parameter set in XG-PD, the error number occurs as follows.

STAT_NUM	Message	Description
1	P2P number setting error	If a value except P_NUM(1~8) is set
2	Block number setting error	If a value except BL_NUM(0~63) is set < In case of Cnet, 0~31 >
3	Variable number setting error	If a variable number not allowed in P2P parameter set in XG-PD is input
4	No slot	-
5	Module inconsistency	No communication module
6	Module inconsistency	Communication module not available in the instruction
10	MODBUS setting error	MODBUS offset can not be input (ex, h10000). Because DEV can be input only for a direct variable
11	Variable size setting error	If a variable size not allowed in P2P parameter set in XG-PD is input
12	Data type setting error	If a variable type not allowed in P2P parameter set in XG-PD is input

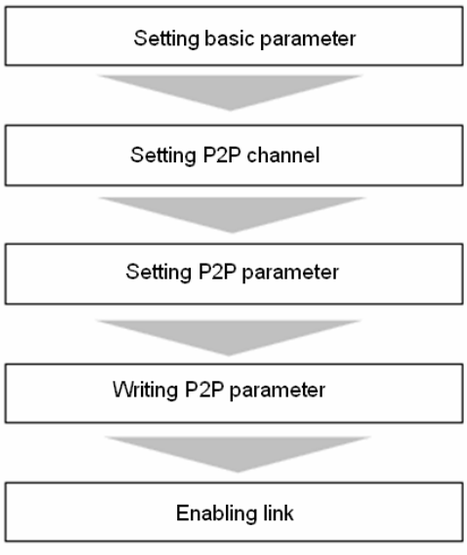
Chapter 8 Modbus Communication

8.1 General

Modbus protocol is specified open protocol used between client-server, which executes reading/writing data according to function code. Communication between devices that use Modbus protocol uses Client-server function in which only one client processes the data.

8.1.1 Procedure of Modbus communication

Procedure of Modbus communication is as follows.



8.2 Modbus Protocol

8.2.1 Kind of modbus protocol

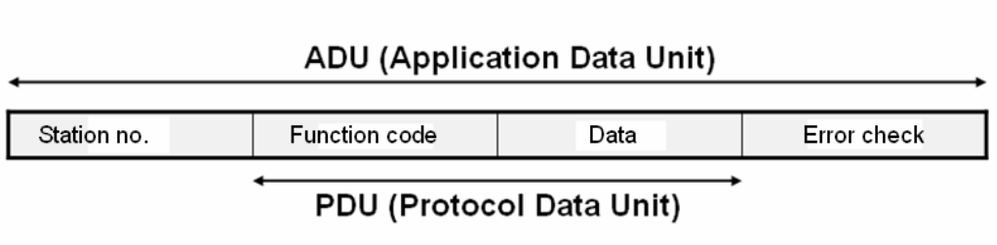
There are two communication modes of Modbus, ASCII and RTU.

Characteristic		ASCII mode	RTU mode
Coding method		ASCII code	8 bit binary code
No. of data per one character	Start bit	1	1
	Data bit	7	8
	Parity bit	Even,Odd,None	Even,Odd,None
	Stop bit	1 or 2	1 or 2
Error check		LRC(Longitudinal Redundancy Check)	CRC (Cyclical Redundancy Check)
Start of frame		Colon (:)	3.5 Character no response time

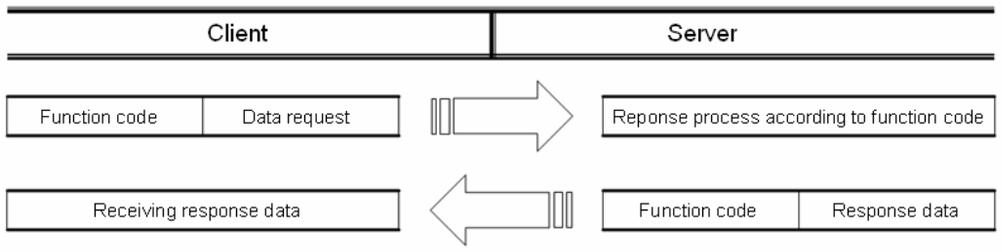
8.2.2 Structure of modbus protocol

Modbus protocol’ s structure is as follows.

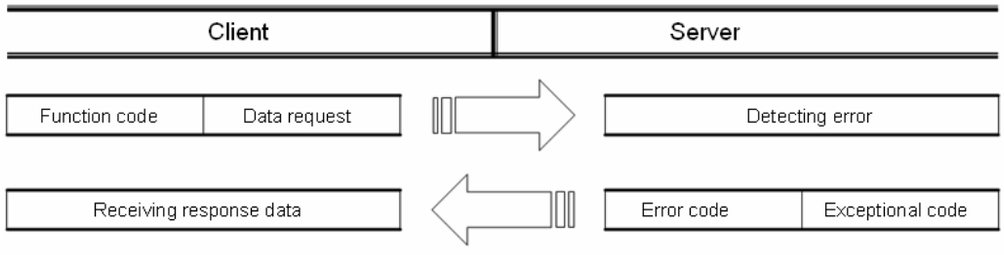
.



In case of normal communication, process step is as follows.



In case of abnormal communication, process step is as follows.



When receiving the abnormal frame from client, server transmits error code and exceptional code. Error code is function code adding 80(Hex) and exceptional code indicate the specific error content. Each code has following content.

Code	Code name	Meaning
01	Function code error	Function code error
02	Address error	Exceeds allowed address range
03	Data setting error	Not allowed data value
04	Server error	Server(slave) is error
05	Server requesting re-transmission	Now server is too busy to process and requests re-transmission later
06	Server process time delay	Server takes time to process. Master should request again.

8.3 Structure of Frame

8.3.1 Structure of frame in the ASCII mode

Frame structure in the ASCII mode is as follows.

Classification	Start	Station no.	Function code	Data	Error check	End
Size (byte)	1	2	2	N	2	2

(1) Characteristic of ASCII mode

(a) In the ASCII mode, start of frame is indicated with colon (:), which is ASCII code, and end of frame is indicated with 'CRLF'.
(b) Each character allows maximum 1s interval.
(c) How to check the error uses LRC, it takes 2's complement except frame of start and end and converts it as ASCII conversion.

(2) Address area

(a) It consists of 2 byte.
(b) When using the XGT Cnet I/F module, range of station is 0~31.
(c) Station number 0 is used for client.
(d) When server responds, it contains self address to response frame to know client's response.

(3) Data area

(a) Transmits the data by using the ASCII data, data structure changes according to function code.
(b) In case of receiving normal frame, it responds as normal response.
(c) In case of receiving abnormal frame, it responds by using error code.

(4) Error check area

How to check error of frame takes 2's complement except start and end of frame and converts it as ASCII.

8.3.2 Frame structure in the RTU mode

Frame structure in the RTU mode is as follows.

Classification	Start	Station number	Function code	Data	Error check	End
size(byte)	Idle time	1	1	N	2	Idle time

(1) Characteristic of RTU mode

(a) It uses hexadecimal.
(b) Start character is station number and frame is classified by CRC error check.
(c) Start and end of frame is classified by adding idle time of 1 bit.
(d) Between frames, there is interval of 3.5 character time. When exceeding 1.5 character time, it is acknowledged as independent frame.

(2) Address area

(a) It consists of 1 byte.
(b) When using the XGT Cnet I/F module, range of station is 0~31.
(c) Station number 0 is used for client.
(d) When server responds, it contains self address to response frame to know client's response.

(3) Data area

(a) Transmits the data by using the Hex. data, data structure changes according to function code.
(b) In case of receiving normal frame, it responds as normal response.
(c) In case of receiving abnormal frame, it responds by using error code.

(4) Error check area

It determines if frame is normal or not by using CRC check of 2 byte.

(5) Modbus address regulation

Address in the data starts from 0 and it is same with value that is minus 1 from modbus memory, Modbus address 2 is same with address 1 of data.

8.3.3 Data and expression of address

To express data and address of modbus protocol, the characteristic is as follows.

(1) It used hexadecimal as basic form.
(2) In the ASCII mode, Hex data is converted into ASCII code.
(3) RTU mode uses Hex data.
(4) Each function code has following meaning.

Code(Hex)	Purpose	Used area	address	Max. response data
01	Read Coil Status	Bit output	0XXXX	2000bit
02	Read Input Status	Bit input	1XXXX	2000bit
03	Read Holding Registers	Word output	4XXXX	125word
04	Read Input Registers	Word input	3XXXX	125word
05	Force Single Coil	Bit output	0XXXX	1bit
06	Preset Single Register	Word output	4XXXX	1word
0F	Force Multiple Coils	Bit output	0XXXX	1968bit
10	Preset Multiple Registers	Word output	4XXXX	120word

8.3.4 Reading data of bit type at the bit output (01)

(1) Reading bit of output area (function code: 01)

In case of reading data of bit type, request and response frame is as follows.
Detail of frame is applied in case of ASCII mode.

(a) Request frame

Frame	Station no.	Function code (01)	Address	Data size	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

(b) Response frame (In case of receiving normal frame)

Frame	Station no.	Function code (01)	No. of byte	Data	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	N	2	2

(c) In case of response frame (In case of receiving abnormal frame)

Frame	Station no.	Error code	Exceptional code	Tail (CRLF)
Size (byte)	1	1	1	2

(2) Details of frame

(a) Station no.: indicates the station no. of slave to read bit of output area.
(b) Function code: '01' indicating Read Coil Status
(c) Address: start address of data to read and it consists of 2 byte. At this time, start address conforms to modbus address regulation.
(d) Data size: size of data to read and it consists of 2 byte.
(e) Frame error check: in case of ASCII mode, it uses LRC and in case of STU mode, it uses CRC. It consists of 2 byte.
(f) Tail: it is applies in case of ASCII mode, CRLF is added after LRC.
(g) No. of byte: no. of byte of response data
(h) Data: makes address of request frame as start address and transmits data with byte unit
(i) Error code: error code is expressed by adding 80(Hex) to function code and in case of reading bit of output area, it is expressed as 81(Hex).
(j) Exceptional code: indicates detail of error and consists of 1 byte

(3) Frame example

Example that requests reading bit of 20~28 to station number 1 server acting as modbus RTU mode

(a) Request frame

Classification	Station no.	Function code	Address		Data size		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	01	00	13	00	13	CRC

(b) Response frame (In case receiving normal frame)

Classification	Station no.	Function code	No. of byte	Data			Error check
Frame	01	01	03	12	31	05	CRC

(c) Response frame (In case of receiving abnormal frame)

Classification	Station no.	Function code	Exceptional code	Error check
Frame	01	81	02	CRC

8.3.5 Read Input Status (02)

(1) Reading bit of input area

In case of reading data of bit type of input area, request and response frame is as follows.
Tail of frame is applied in case of ASCII mode.

(a) Request frame

Classification	Station no.	Function code (02)	Address	Data size	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

(b) Response frame (In case of receiving normal frame)

Classification	Station no.	Function code (02)	No. of byte	Data	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	N	2	2

(c) Response frame (In case of receiving abnormal frame)

Classification	Station no.	Error code	Exceptional code	Tail (CRLF)
Size (byte)	1	1	1	2

(2) Details of frame

(a) Station no.: indicates station no. of slave to read bit of input area
(b) Function code: '02' indicating Read Input Status
(c) Address: indicating start address of data to read. It consists of 2 byte. At this time, start address conforms to modbus address regulation.
(d) Data size: size of data to read, consists of 2 byte
(e) Frame error check: in case of ASCII mode, it uses LRC and in case of STU mode, it uses CRC for error check. It consists of 2 byte.
(f) Tail: it is applied in case of ASCII mode, CRLF is added after LRC.
(g) No. of byte: no. of byte of data responding
(h) Data: address of request frame is start address and transmits data with byte unit.
(i) Error code: Error code is expressed by adding 80(Hex) and in case of reading bit of output area, it is expressed 82(Hex).
(j) Exceptional code: details of error, consists of 1 byte.

(3) Frame example

Example that reads bit (20~38) from station number 1 server acting as modbus RTU

(a) Request frame

Classification	Station no.	Function code	Address		Data size		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	02	00	13	00	13	CRC

(b) Response frame (When receiving normal frame)

Classification	Station no.	Function code	No. of byte	Data			Error check
Frame	01	02	03	12	31	05	CRC

(c) Response frame (When receiving abnormal frame)

Classification	Station no.	Function code	Exceptional code	Error check
Frame	01	82	02	CRC

8.3.6 Read Holding Registers (03)

(1) Reading word of output area

When reading data of word type of output area, request and response frame is as follows.
Tail of frame is applied in case of ASCII mode.

(a) Request frame

Classification	Station no.	Function code (03)	Address	Data size	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

(b) Response frame (When receiving normal frame)

Classification	Station no.	Function code (03)	No. of byte	Data	Frame error check	Tail (CRLF)
Size (Byte)	1	1	2	N*2	2	2

(c) Response frame (When receiving abnormal frame)

Classification	Station no.	Error code	Exceptional code	Tail (CRLF)
Size (byte)	1	1	1	2

(2) Details of frame

(a) Station no.: indicates the station no. of slave to read word data of output area.
(b) Function code: '03' indicating Read Holding Registers
(c) Address: indicating start address of data to read. It consists of 2 byte. At this time, start address conforms to modbus address regulation.
(d) Data size: size of data to read, consists of 2 byte
(e) Frame error check: in case of ASCII mode, it uses LRC and in case of STU mode, it uses CRC for error check. It consists of 2 byte.
(f) Tail: it is applied in case of ASCII mode, CRLF is added after LRC.
(g) No. of byte: no. of byte of data responding
(h) Data: address of request frame is start address and transmits data with byte unit. At this time, since data is word type, it is double of no. of byte.
(i) Error code: error code is expressed by adding 80(Hex) and in case of reading word of output area, it is expressed 83(Hex).
(j) Exceptional code: details of error, consists of 1 byte.

(3) Frame example

Example that reads word (108~110) from station number 1 server acting as modbus RTU

(a) Request frame

Classification	Station no.	Function code	Address		Data size		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	03	00	6B	00	03	CRC

(b) Response frame (receiving normal frame)

Classification	Station no.	Function code	No. of byte	Data						Error check
Frame	01	03	06	13	12	3D	12	40	4F	CRC

(c) Response frame (receiving abnormal frame)

Classification	Station no.	Function code	Exceptional code	Error check
Frame	01	83	04	CRC

8.3.7 Read Input Registers (04)

(1) Reading word of input area

In case of reading word of input area, request and response frame is as follows.
Tail of frame is applied in case of ASCII mode.

(a) Request frame

Classification	Station no.	Function code (04)	Address	Data size	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

(b) Response frame (In case of receiving normal frame)

Classification	Station no.	Function code (04)	No. of byte	Data	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	N*2	2	2

(c) In case of response frame (In case of receiving abnormal frame)

Classification	Station no.	Error code	Exceptional code	Tail (CRLF)
Size (byte)	1	1	1	2

(2) Details of frame

(a) Station no.: indicates the station no. of slave to read word of input area.
(b) Function code: '04' indicating Read Input Registers
(c) Address: start address of data to read and it consists of 2 byte. At this time, start address conforms to modbus address regulation.
(d) Data size: size of data to read and it consists of 2 byte.
(e) Frame error check: in case of ASCII mode, it uses LRC and in case of STU mode, it uses CRC. It consists of 2 byte.
(f) Tail: it is applies in case of ASCII mode, CRLF is added after LRC.
(g) No. of byte: no. of byte of response data
(h) Data: makes address of request frame as start address and transmits data with byte unit. At this time, since data is word type, it is double of no. of byte.
(i) Error code: error code is expressed by adding 80(Hex) to function code and in case of reading word of input area, it is expressed as 84(Hex).
(j) Exceptional code: indicates detail of error and consists of 1 byte

(3) Frame example

Example that requests reading word of 9 to station number 1 server acting as modbus RTU mode

(a) Request frame

Classification	Station no.	Function code	Address		Data size		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	04	00	08	00	01	CRC

(b) Response frame (In case receiving normal frame)

Classification	Station no.	Function code	No. of byte	Data		Error check
Frame	01	04	02	00	0A	CRC

(c) Response frame (In case of receiving abnormal frame)

Classification	Station no.	Function code	Exceptional code	Error check
Frame	01	84	04	CRC

8.3.8 Force Single Coil (05)

(1) Writing single bit of output area

When writing single bit of output area, request and response frame is as follows.
Tail of frame is applied in case of ASCII mode.

(a) Request frame

Classification	Station no.	Function code (05)	Address	Output	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

(b) Response frame (In case of receiving normal frame)

Classification	Station no.	Function code (05)	Address	Output	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

(c) In case of response frame (In case of receiving abnormal frame)

Classification	Station no.	Error code	Exceptional code	Tail (CRLF)
Size (byte)	1	1	1	2

(2) Details of frame

(a) Station no.: indicates the station no. of slave to write single bit of output area.
(b) Function code: '05' indicating Force Single Coil
(c) Address: start address of data to write and it consists of 2 byte. At this time, start address conforms to modbus address regulation.
(d) Output: in case of turning on address set in the Address, FF00(Hex) is indicated and in case of turning off addres set in the Address, it is indicated 0000(Hex).
(e) Frame error check: in case of ASCII mode, it uses LRC and in case of STU mode, it uses CRC. It consists of 2 byte.
(f) Tail: it is applies in case of ASCII mode, CRLF is added after LRC.
(g) No. of byte: no. of byte of response data
(h) Error code: error code is expressed by adding 80(Hex) to function code and in case of Force Single Coil, it is expressed as 85(Hex).
(i) Exceptional code: indicates detail of error and consists of 1 byte

(3) Frame example

Example that turning on 9th bit to station number 1 server acting as Modbus RTU mode

(a) Request frame

Classification	Station no.	Function code	Address		Output		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	05	00	08	FF	00	CRC

(b) Response frame (In case receiving normal frame)

Classification	Station no.	Function code	Address		Output		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	05	00	08	FF	00	CRC

(c) Response frame (In case of receiving abnormal frame)

Classification	Station no.	Function code	Exceptional code	Error check
Frame	01	85	04	CRC

8.3.9 Preset Single Register (06)

(1) Writing single word of output area

In case of writing single word to output area, request and response frame is as follows.
Detail of frame is applied in case of ASCII mode.

a) Request frame

Classification	Station no.	Function code (06)	Address	Output	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

b) Response frame (In case of receiving normal frame)

Classification	Station no.	Function code (06)	Address	Output	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

c) In case of response frame (In case of receiving abnormal frame)

Classification	Station no.	Error code	Exceptional code	Tail (CRLF)
Size (byte)	1	1	1	2

(2) Details of frame

(a) Station no.: indicates the station no. of slave to write single word of output area.
(b) Function code: '06' indicating Preset Single Register
(c) Address: start address of data to write and it consists of 2 byte. At this time, start address conforms to modbus address regulation.
(d) Output: data value to write in the address set in the Address.
(e) Frame error check: in case of ASCII mode, it uses LRC and in case of STU mode, it uses CRC. It consists of 2 byte.
(f) Tail: it is applies in case of ASCII mode, CRLF is added after LRC.
(g) No. of byte: no. of byte of response data
(h) Error code: error code is expressed by adding 80(Hex) to function code and in case of writing single word of output area, it is expressed as 86(Hex).
(i) Exceptional code: indicates detail of error and consists of 1 byte

(3) Frame example

Example writing 0003(Hex) to 9th word of station number 1 server acting as modbus RTU mode

(a) Request frame

Classification	Station no.	Function code	Address		Output		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	06	00	08	00	03	CRC

(b) Response frame (In case receiving normal frame)

Classification	Station no.	Function code	Address		Output		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	06	00	08	00	03	CRC

(c) Response frame (In case of receiving abnormal frame)

Classification	Station no.	Function code	Exceptional code	Error check
Frame	01	86	02	CRC

8.3.10 Force Multiple Coils (0F)

(1) Writing continuous bit to output area

In case of writing continuous bit to output area, request and response frame is as follows.
Tail of frame is applied in case of ASCII mode.

(a) Request frame

Classification	Station no.	Function code (0F)	Address	No. of output	Data size	Output	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	1	N	2	2

(b) Response frame (In case of receiving normal frame)

Classification	Station no.	Function code (0F)	Address	No. of output	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

(c) In case of response frame (In case of receiving abnormal frame)

Classification	Station no.	Error code	Exceptional code	Tail (CRLF)
Size (byte)	1	1	1	2

(2) Details of frame

(a) Station no.: indicates the station no. of slave to write continuous bit of output area.
(b) Function code: '06' indicating Force Multiple Coils
(c) Address: start address of data to read and it consists of 2 byte. At this time, start address conforms to Modbus address regulation.
(d) No. of output: no. of output to write and it consists of 2 byte
Ex.) When writing 10 continuous data from address number 20, no. of output is 000A(Hex)

(e) Data size: indicates no. of output as byte. Namely, in case data size is 1, no. of data is 8.
Ex.) In case of writing 10 continuous bits, data size is 2.
(f) Output: data value to write in the address set in the Address.
(g) Frame error check: in case of ASCII mode, it uses LRC and in case of STU mode, it uses CRC. It consists of 2 byte.
(h) Tail: it is applies in case of ASCII mode, CRLF is added after LRC.
(i) No. of byte: no. of byte of response data
(j) Error code: error code is expressed by adding 80(Hex) to function code and in case of writing continuous bit of output area, it is expressed as 8F(Hex).
(k) Exceptional code: indicates detail of error and consists of 1 byte.

(3) Frame example

Example writing 10 continuous bits starting 20th address of 1 server acting as Modbus RTU mode

Ex.) Data value to write continuously

Bit value	1	1	0	0	1	1	0	1	0	0	0	0	0	0	0	1
Hex	C				D				0				1			
Address	27	26	25	24	23	22	21	20	-	-	-	-	-	-	29	28

(a) Request frame

Classification	Station no.	Function code	Address		No. of output		Data size	Output		Error check
			Upper byte	Lower byte	Upper byte	Lower byte		Upper byte	Lower byte	
Frame	01	0F	00	13	00	0A	02	CD	01	CRC

(b) Response frame (In case receiving normal frame)

Classification	Station no.	Function code	Address		No. of output		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	04	00	13	00	0A	CRC

(c) Response frame (In case of receiving abnormal frame)

Classification	Station no.	Function code	Exceptional code	Error check
Frame	01	8F	01	CRC

8.3.11 Preset Multiple Registers (10)

(1) Writing word continuously to output area

In case of writing word continuously to output area, request and response frame is as follows.
Tail of frame is applied in case of ASCII mode.

(a) Request frame

Classification	Station no.	Function code (10)	Address	No. of output	Data size	Output	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	1	N*2	2	2

(b) Response frame (In case of receiving normal frame)

Classification	Station no.	Function code (10)	Address	No. of output	Frame error check	Tail (CRLF)
Size (byte)	1	1	2	2	2	2

(c) In case of response frame (In case of receiving abnormal frame)

Classification	Station no.	Error code	Exceptional code	Tail (CRLF)
Size (byte)	1	1	1	2

(2) Details of frame

(a) Station no.: indicates the station no. of slave to write continuous word of output area.
(b) Function code: '10' indicating Preset Multiple Registers
(c) Address: start address of data to read and it consists of 2 byte. At this time, start address conforms to modbus address regulation.
(d) No. of output: no. of output to write and it consists of 2 byte
Ex.) When writing 10 continuous data from address number 20, no. of output is 000A(Hex)
(e) Data size: indicates no. of output as byte. Since data type is word, in case of writing data of 1 word, data size is 2.
(f) Output: data value to write in the address set in the Address.
(g) Frame error check: in case of ASCII mode, it uses LRC and in case of STU mode, it uses CRC. It consists of 2 byte.
(h) Tail: it is applies in case of ASCII mode, CRLF is added after LRC.
(i) No. of byte: no. of byte of response data
(j) Error code: error code is expressed by adding 80(Hex) to function code and in case of writing continuous word of output area, it is expressed as 90(Hex).
(k) Exceptional code: indicates detail of error and consists of 1 byte.

(3) Frame example

Example writing continuous 2 words starting 20th address of server 1acting as Modbus RTU mode

Ex.) value to write continuously

Hex	C	D	0	1	0	0	0	A
Address	20				21			

(a) Request frame

Classification	Station no.	Function code	Address		No. of output		Data size	Output				Error check
			Upper byte	Lower byte	Upper byte	Lower byte						
Frame	01	10	00	13	00	02	04	CD	01	00	0A	CRC

(b) Response frame (In case receiving normal frame)

Classification	Station no.	Function code	Address		No. of output		Error check
			Upper byte	Lower byte	Upper byte	Lower byte	
Frame	01	10	00	13	00	02	CRC

(c) Response frame (In case of receiving abnormal frame)

Classification	Station no.	Function code	Exceptional code	Error check
Frame	01	90	01	CRC

8.4 Modbus Server

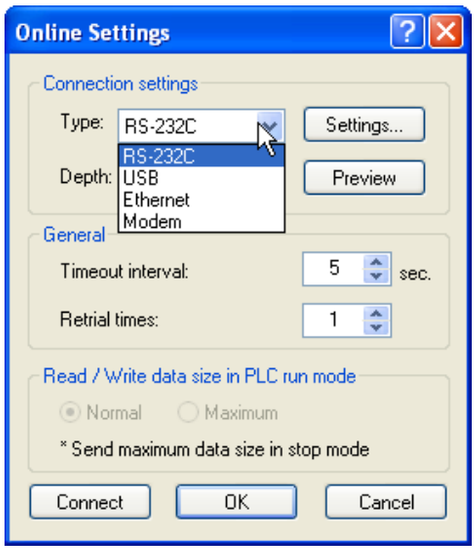
This is used when partner communication device acts as Modbus client. XGT supports ASCII mode and RTU mode of Modbus, it can be defined in the standard setting window.

8.4.1 Setting when CPU is XGK series and Cnet acts as ASCII server

(1) Connection setting

(a) Select [Online]-[Connection settings].

(b) After setting, click Connection.



(2) Reading I/O information

Select [Online] - [Read I/O Information]

Reads the information about currently equipped module

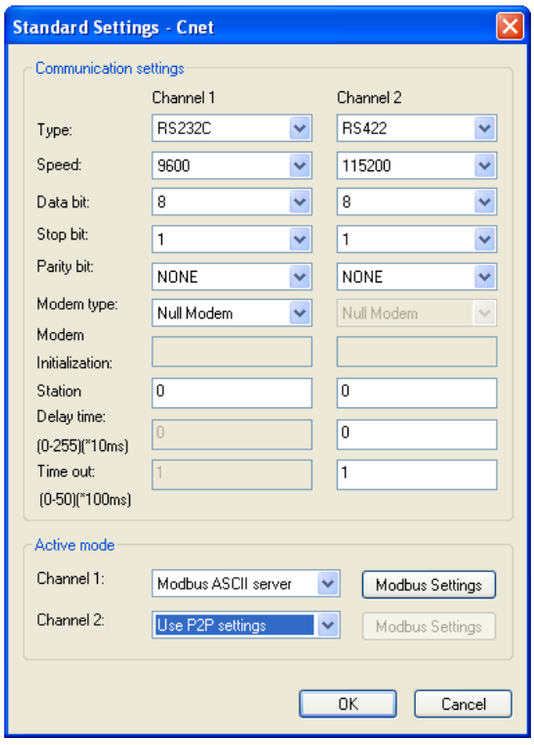
(3) Standard settings

(a) Double-click the relevant Cnet I/F module and execute the standard setting window.

Set Type, Speed, Modem type, Data bit, Stop bit and Station. At this time, data bit should be 7.

(b) Modem initialization is activated when modem type is dial-up modem not null modem.

(c) Delay time is activated in case of RS422/485 and Time out is activated in case of P2P mode.



(4) Selecting active mode

Select Modbus ASCII server.

(5) Modbus settings

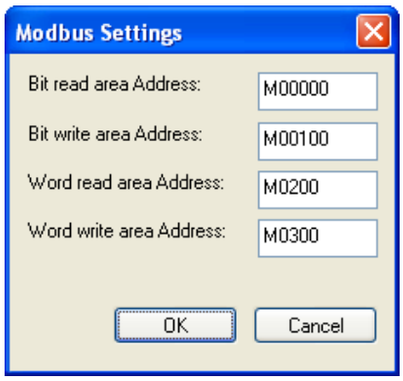
(a) Modbus settings is activated when selecting Active mode as Modbus ASCII server.

(b) Bit read area Address: indicates Bit read area start address and it consists of 5 digits. At this time, first 4 digits indicate word value and last one digit indicates bit value.
Ex.) In case of M00000: 0^{th} bit of 0^{th} word of M device area is select as start address.

(c) Bit write area Address: indicates Bit write area start address and it consists of 5 gidits. At this time, first 4 digits indicates word value and last one digit indicates bit value.
Ex.) In case of M00100: 0^{th} bit of 10^{th} word of M device is select as start address.

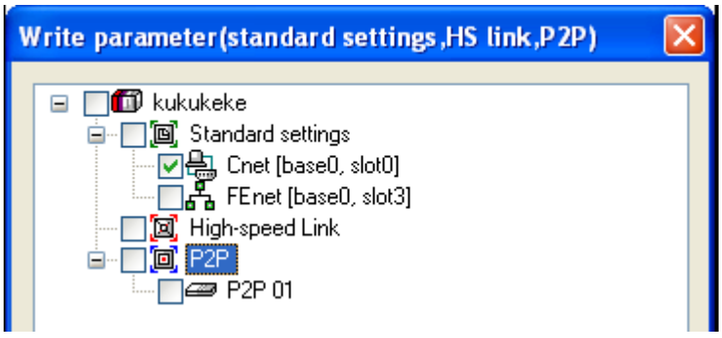
(d) Word read area Address: indicates Word read area start address and it consists of 4 digits.
Ex.) In case of M00200: 200^{th} word of M device is select as start address of Word read area Address.

(e) Word write area Address: indicates Word write area tart address and it consists of 4 digits.
Ex.) In case of M00300: 300^{th} word of M device is select as start address of Word write area Address.



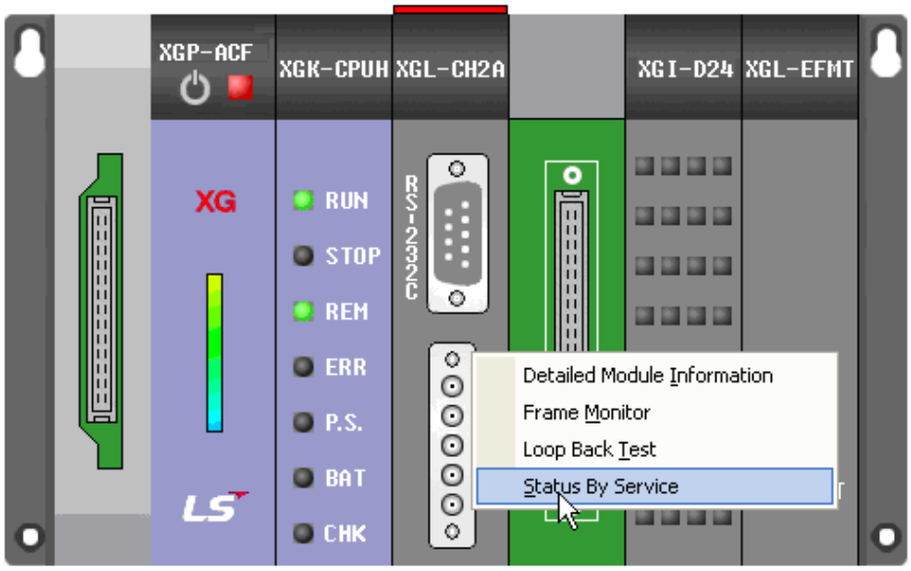
(6) Writing parameter

(a) Select [Online] – [Write Parameter].
(b) Select the module to write and click OK.
(c) Reset the module.



(7) Checking the operation

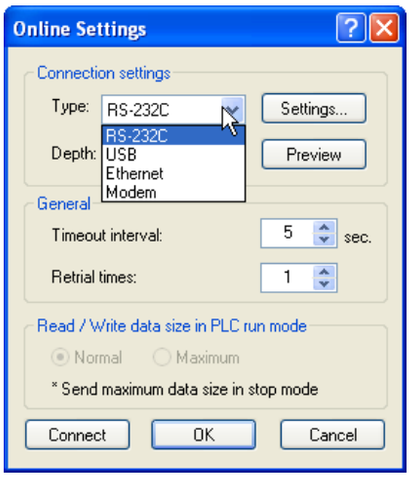
(1) Select [Online] - [System Diagnosis].
(2) Click the right button on the the relevant module and click Frame Monitor or Status By Service.



8.4.2 Setting when CPU is XGI/XGR series and Cnet acts as ASCII server

(1) Connection setting

(a) Select [Online] -> [Connection Settings]
(b) Click Connect after setting.



(2) Reading I/O information

Select [Online] - [Read I/O Information]

Reads the information about currently equipped module

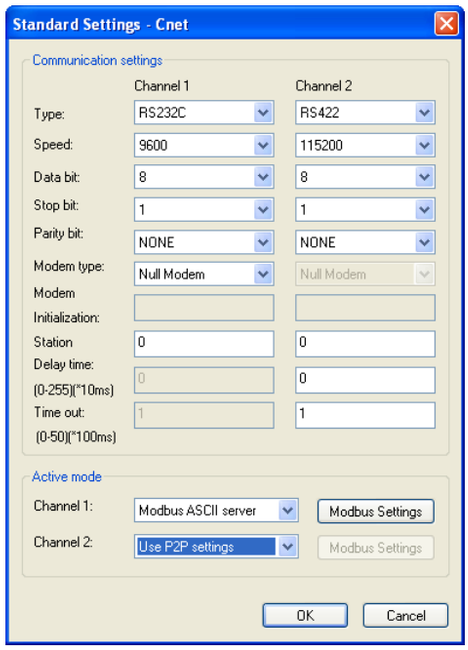
(3) Standard settings

(a) Double-click the relevant Cnet I/F module and execute the standard setting window.

Set Type, Speed, Modem type, Data bit, Stop bit and Station. At this time, data bit should be 7.

(b) Modem initialization is activated when modem type is dial-up modem not null modem.

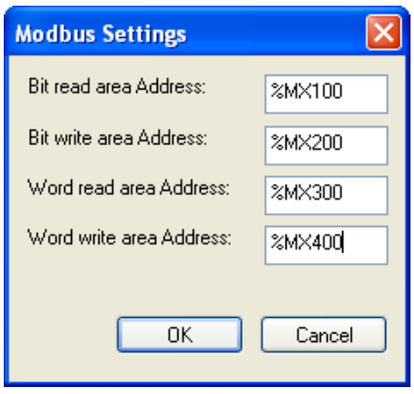
(c) Delay time is activated in case of RS422/485 and Time out is activated in case of P2P mode.



(4) Selecting active mode

Select Modbus ASCII server

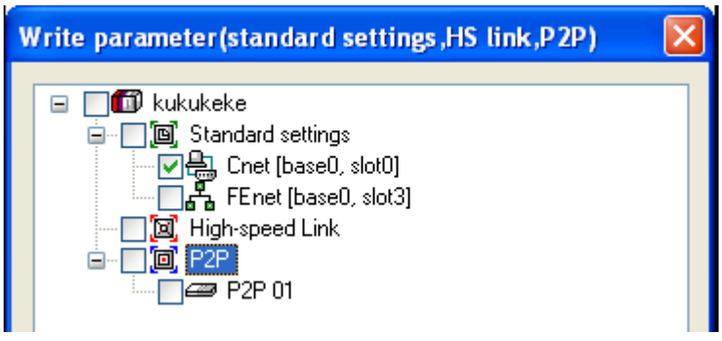
(5) Modbus settings



(a) Modbus settings is activated when selecting Active mode as Modbus ASCII server.
(b) Bit read area Address: indicates Bit read area start address
Ex.) In case of %MX100: 100th bit of M device is selected as start address of Bit read area Address.
(c) Bit write area Address: indicates Bit read area start address
Ex.) In case of %MX200: 200th bit of M device is selected as start address of Bit write area Address.
(d) Word read area Address: indicates Word read area start address.
Ex.) In case of %MW300: 300th word of M device is selected as start address of Word read area Address.
(e) Word write area Address: indicates Word write area start address
Ex.) In case of %MW400: 400th word of M device is selected start address of Word write area Address.

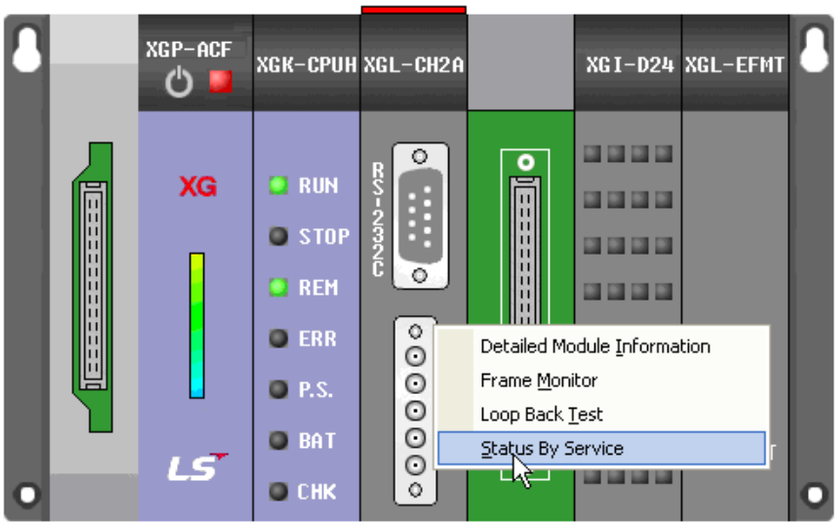
(6) Writing parameter

(a) Select [Online] – [Write Parameter].
(b) Select the module to write and click OK.
(c) Reset the module.



(7) Checking the operation

(a) Select [Online] - [System Diagnosis].
(b) Click the right button on the the relevant module and click Frame Monitor or Status By Service.

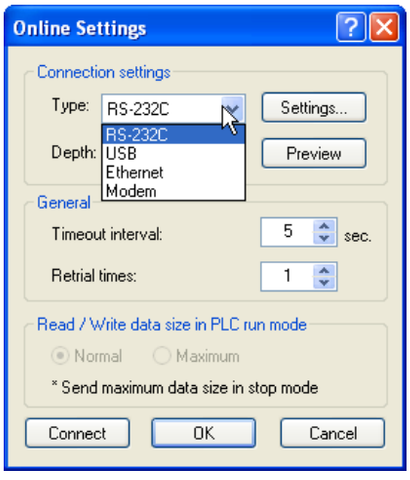


8.4.3 Setting when CPU is XGK series and Cnet acts as Modbus RTU server

(1) Connection settings

(a) Select [Online]-[Connection settings].

(b) After setting, click Connection.



(2) Reading I/O information

Select [Online] - [Read I/O Information]

Reads the information about currently equipped module

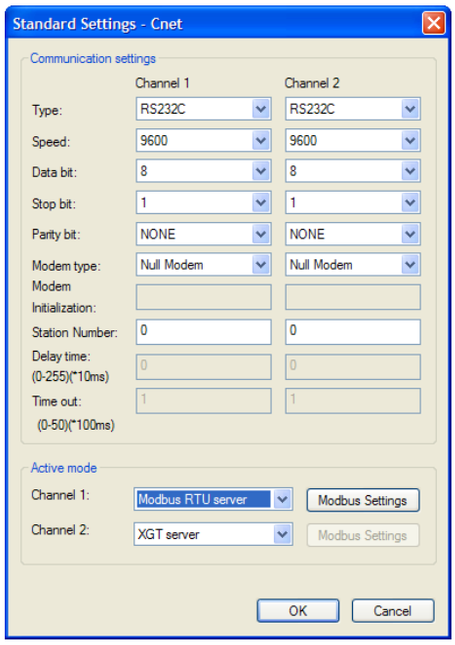
(3) Standard settings

(a) Double-click the relevant Cnet I/F module and execute the standard setting window.

Set Type, Speed, Modem type, Data bit, Stop bit and Station. At this time, data bit should be 8.

(b) Modem initialization is activated when modem type is dial-up modem not null modem.

(c) Delay time is activated in case of RS422/485 and Time out is activated in case of P2P mode.

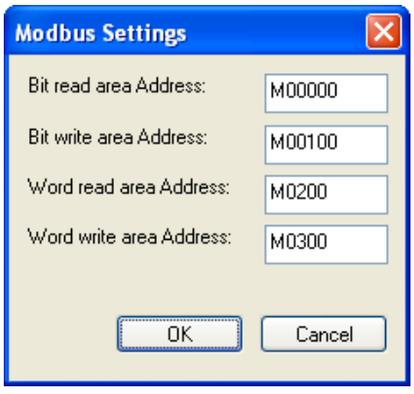


(4) Selecting active mode

Select Modbus RTU server.

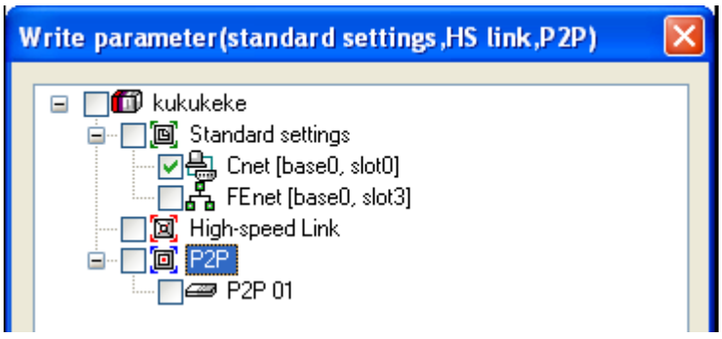
(5) Modbus settings

(a) Modbus settings is activated when selecting Active mode as Modbus RTU server.
(b) Bit read area Address: indicates Bit read area start address and it consists of 5 digits. At this time, first 4 digits indicate word value and last one digit indicates bit value.
Ex.) In case of M00000: 0^{th} bit of 0^{th} word of M device area is select as start address.
(c) Bit write area Address: indicates Bit write area start address and it consists of 5 gidits. At this time, first 4 digits indicates word value and last one digit indicates bit value.
Ex.) In case of M00100: 0^{th} bit of 10^{th} word of M device is select as start address.
(d) Word read area Address: indicates Word read area start address and it consists of 4 digits.
Ex.) In case of M00200: 200^{th} word of M device is select as start address of Word read area Address.
(e) Word write area Address: indicates Word write area tart address and it consists of 4 digits.
Ex.) In case of M00300: 300^{th} word of M device is select as start address of Word write area Address.



(6) Writing parameter

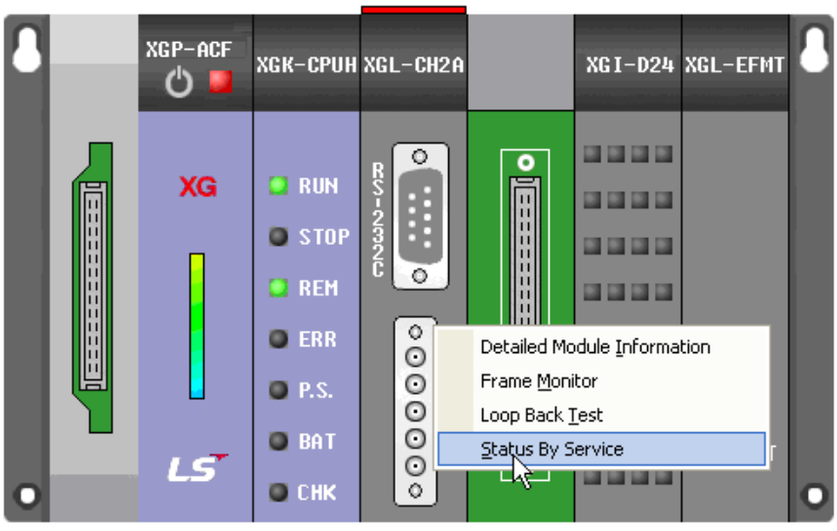
(a) Select [Online] – [Write Parameter].
(b) Select the module to write and click OK.
(c) Reset the module.



(7) Checking the operation

(a) Select [Online] - [System Diagnosis].

(b) Click the right button on the the relevant module and click Frame Monitor or Status By Service.

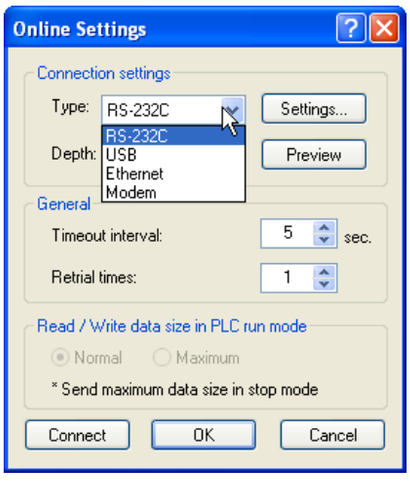


8.4.4 Setting when CPU is XGI/XGR series and Cnet acts as Modbus RTU server

(1) Connection setting

(a) Select [Online]-[Connection settings].

(b) After setting, click Connection.



(2) Reading I/O information

Select [Online] - [Read I/O Information]

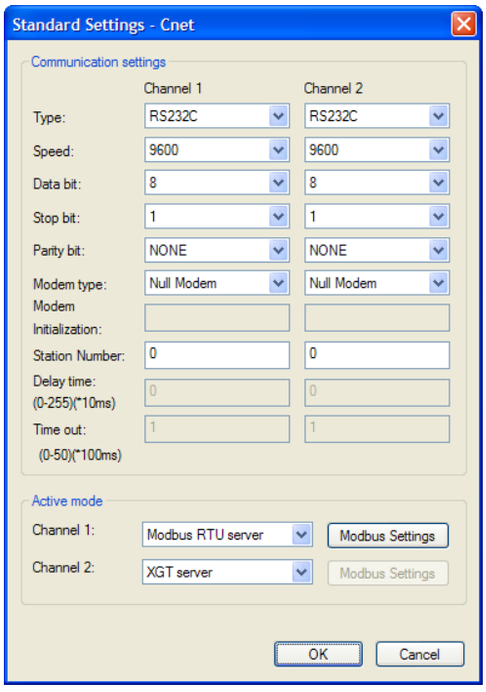
Reads the information about currently equipped module

(3) Standard settings

(a) Double-click the relevant Cnet I/F module and execute the standard setting window.
Set Type, Speed, Modem type, Data bit, Stop bit and Station. At this time, data bit should be 8.

(b) Modem initialization is activated when modem type is dial-up modem not null modem.

(c) Delay time is activated in case of RS422/485 and Time out is activated in case of P2P mode.



(4) Selecting active mode

Select Modbus RTU server.

(5) Modbus settings

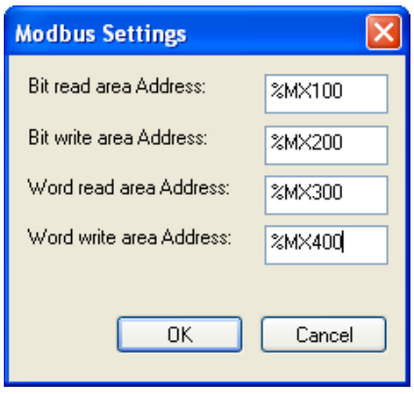
(a) Modbus settings is activated when selecting Active mode as Modbus RTU server.

(b) Bit read area Address: indicates Bit read area start address
Ex.) In case of %MX100: 100th bit of M device is selected as start address of Bit read area Address.

(c) Bit write area Address: indicates Bit read area start address
Ex.) In case of %MX200: 200th bit of M device is selected as start address of Bit write area Address.

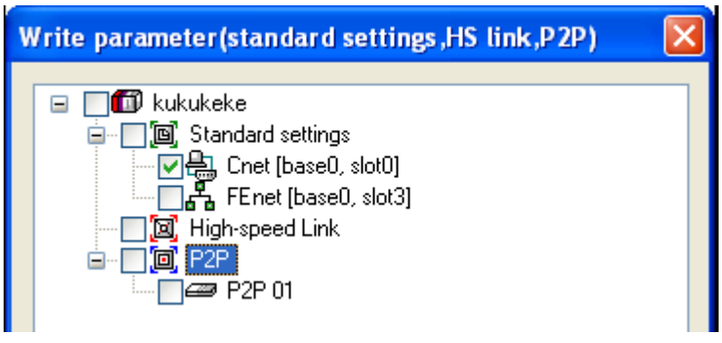
(d) Word read area Address: indicates Word read area start address.
Ex.) In case of %MW300: 300th word of M device is selected as start address of Word read area Address.

(e) Word write area Address: indicates Word write area start address
Ex.) In case of %MW400: 400th word of M device is selected start address of Word write area Address.



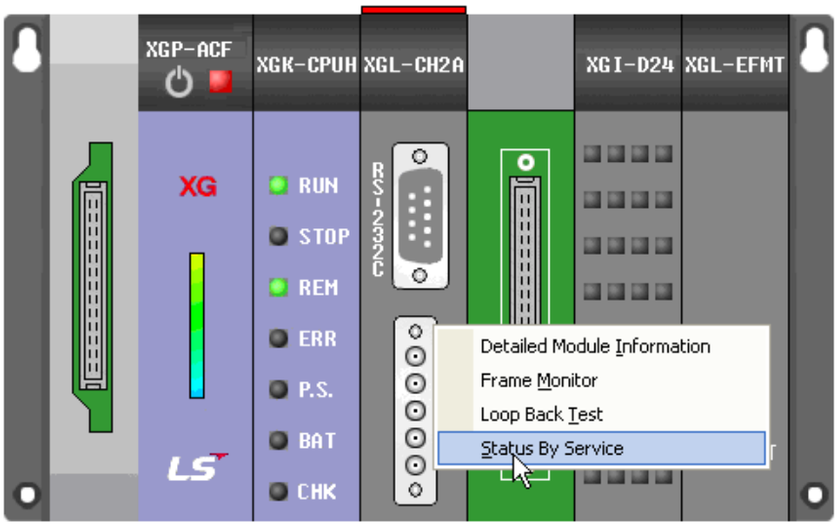
(6) Writing parameter

(a) Select [Online] – [Write Parameter].
(b) Select the module to write and click OK.
(c) Reset the module.



(7) Checking the operation

(1) Select [Online] - [System Diagnosis].
(2) Click the right button on the the relevant module and click Frame Monitor or Status By Service.

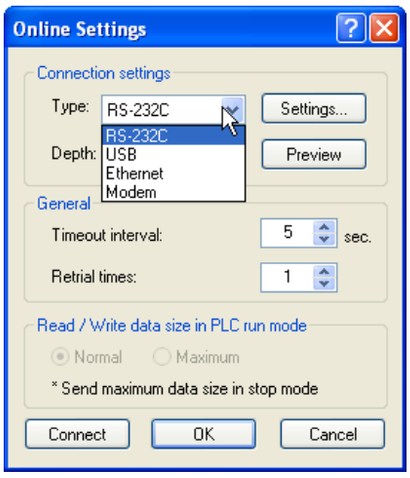

XGP-ACF
XGK-CPUH
XGL-CH2A
XGI-D24
XGL-EFMT
XG
RUN
STOP
REM
ERR
P.S.
BAT
CHK
RS-232C
Detailed Module Information
Frame Monitor
Loop Back Test
Status By Service

8.5 Modbus RTU/ASCII Client

8.5.1 Standard settings in case of Modbus client

(1) Connection setting

(a) Select [Online] -> [Connection Settings]
(b) Click Connect after setting.

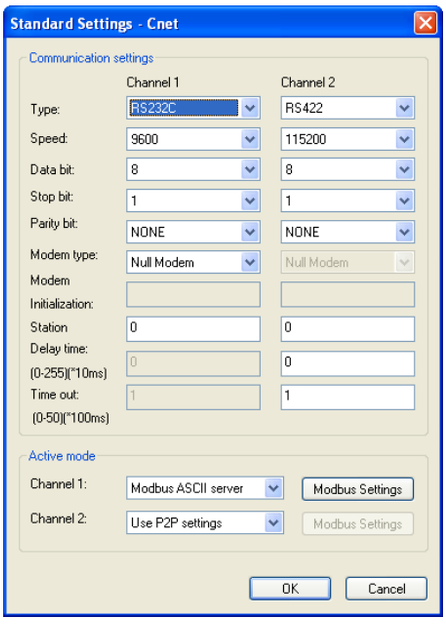


(2) Reading I/O information

Select [Online] - [Read I/O Information]
Reads the information about currently equipped module

(3) Standard settings

(a) Double-click the relevant Cnet I/F module and execute the standard setting window.
Set Type, Speed, Modem type, Data bit, Stop bit and Station.
(b) In case of RTU mode, data bit should be 8 and in case of ASCII mode, data it should be 7.
(c) Modem initialization is activated when modem type is dial-up modem not null modem.
(d) Delay time is activated in case of RS422/485 and Time out is activated in case of P2P mode.

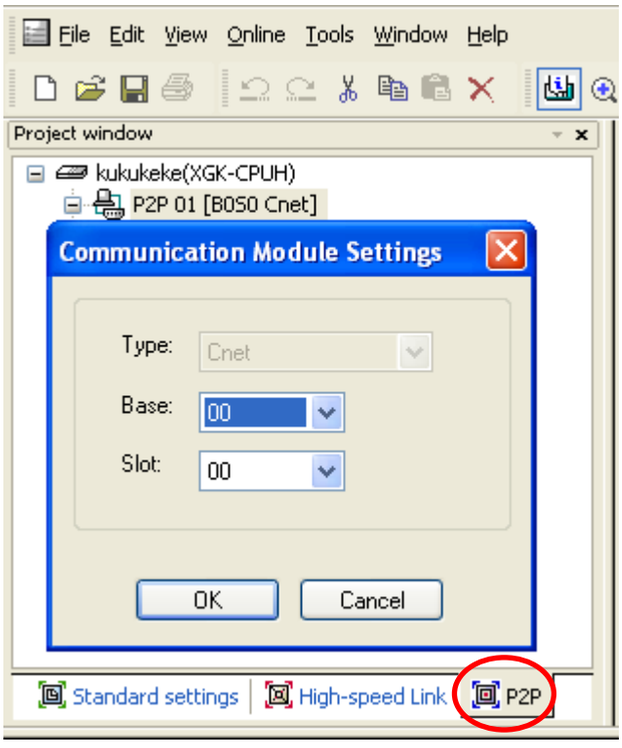


(4) Selecting active mode

Select Use P2P settings.

(5) P2P setting

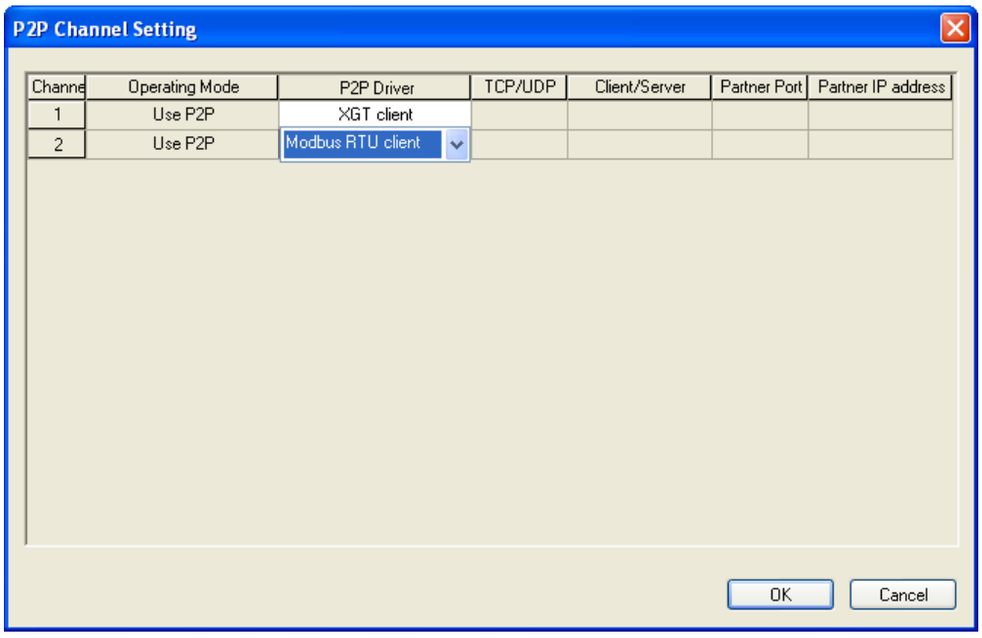
After selecting standard P2P settings tap, double-click P2P block and input base no. and slot no. of communication module.



(6) P2P channel setting

(a) Double-click P2P driver and select protocol for each channel.

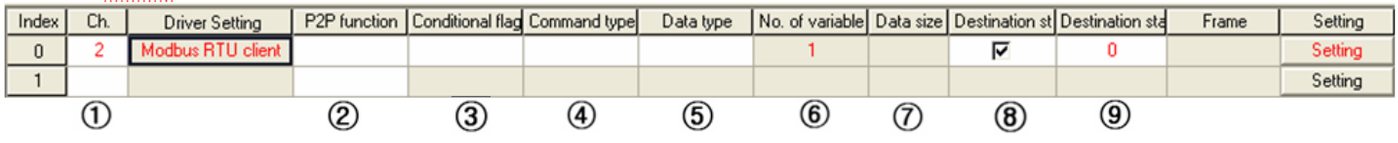
(b) P2P driver supports user frame definition, XGT client, Modbus RTU/ASCII client.

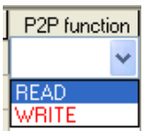


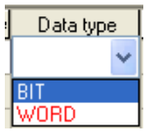
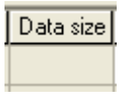
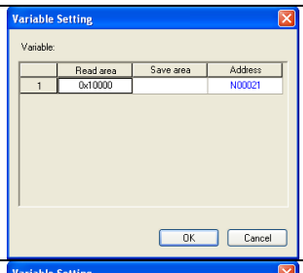
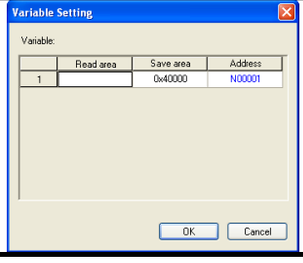
8.5.2 Settings in case of Modbus RTU/ASCII client

There are two commands; Write (writes memory of self station to destination station's memory area) and Read (reads memory of destination memory and saves it in the memory area of self station)

Setting methods of both RTU and ASCII clients are same.



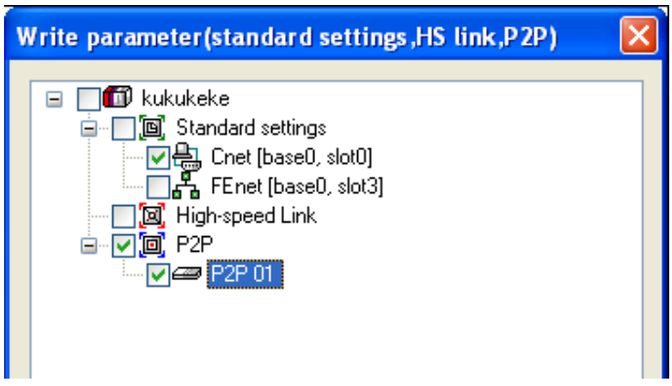
No.	Type	Block type	Meaning
1	Channel		Driver name changes according to driver set in the P2P Driver.
2	P2P function		1. Read : when reading the destination station's memory 2. Write: when writing self-station's memory to destination station's memory.
3	Conditional flag		1. Determines when Cent sends frame 2. In case of XGK type Ex. : F90(20ms flag), M01 3. In case of XGI type Ex. : _T20MS(20ms flag), %MX01

No.	Type	Block type	Meaning
4	Command type		1. single: When reading/writing max. 4 memory areas. (Ex. : M01, M10, M20, M30) 2. continuous: When reading/writing continuous memory areas. (Ex. : M01~M10)
5	Data type		Data type can be bit or word.
6	Data size		▷Determines size of data to communicate and it is activated when command type is continuous. 1. when P2P function is Read 1) Modbus RTU client (1)Bit type : 1~2000 (2)Word type : 1~125 2) Modbus ASCII client (1)Bit type : 1~976 (2)Word type : 1~61 2. when P2P function is Write 1) Modbus RTU client (1)Bit type : 1~1968 (2)Word type : 1~123 2) Modbus ASCII client (1)Bit type : 1~944 (2)Word type : 1~125
7	Destination station		1. It is checked automatically. 2. In case that the user doesn't want to use relevant block, remove the check indication. Then that block doesn't work.
8	Destination station number		1. Destination station number, setting range is 0~31.
9	Setting		▶ When P2P function is Read 1. Read area: device area of server 1) Bit: bit input (0x10000), bit output (0x00000) 2) Word: word input (0x30000), word output (0x40000) 2. Save area: client's device to save the data
			▶ When P2P function is Write 1. Read area: device area of self station 2. Save area: server's device area to save the data 1) Bit: bit input (0x10000), bit output (0x00000) 2) Word: word input (0x30000), word output (0x40000)

8.5.3 Writing the parameter

(1) Writing the parameter

(a) Select [Online] – [Write Parameter].
(b) Select the module in which parameter setting is completed.
(c) After writing, reset the module.

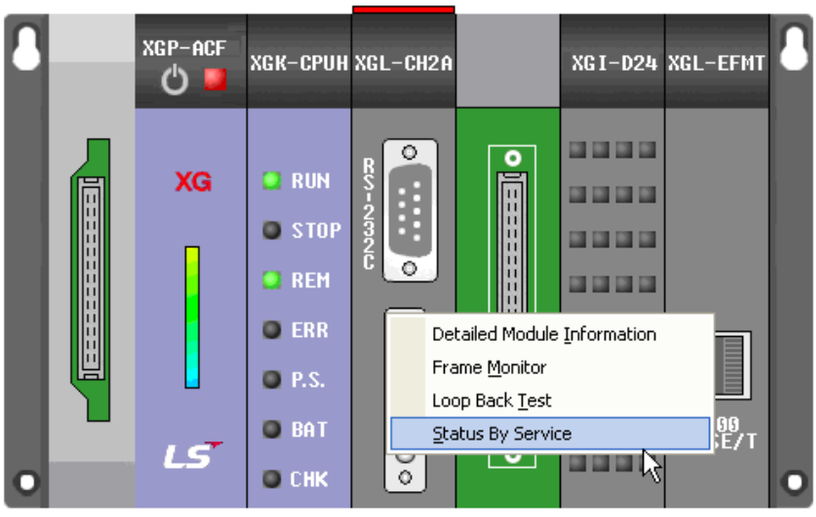


(2) Enabling the link

(a) Select [Online] – [Enable Link].
(b) Click the P2P to enable and click Write.

(3) Checking the operation

(a) Select [Online] – [System Diagnosis].
(b) Click the right button on the relevant module and click Frame Monitor or Status By Service.

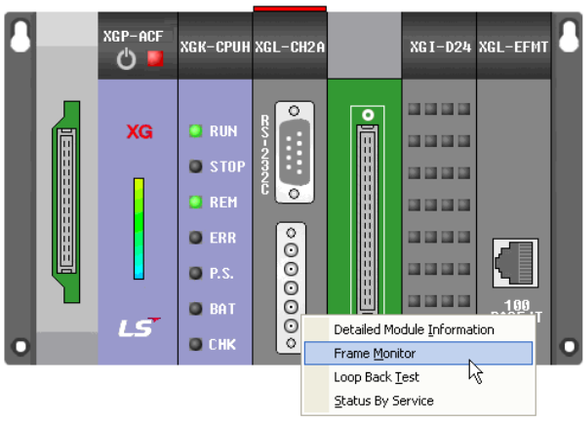


8.6 Frame Monitor

The user can check the TRX frame of Cnet module by using the frame monitor.

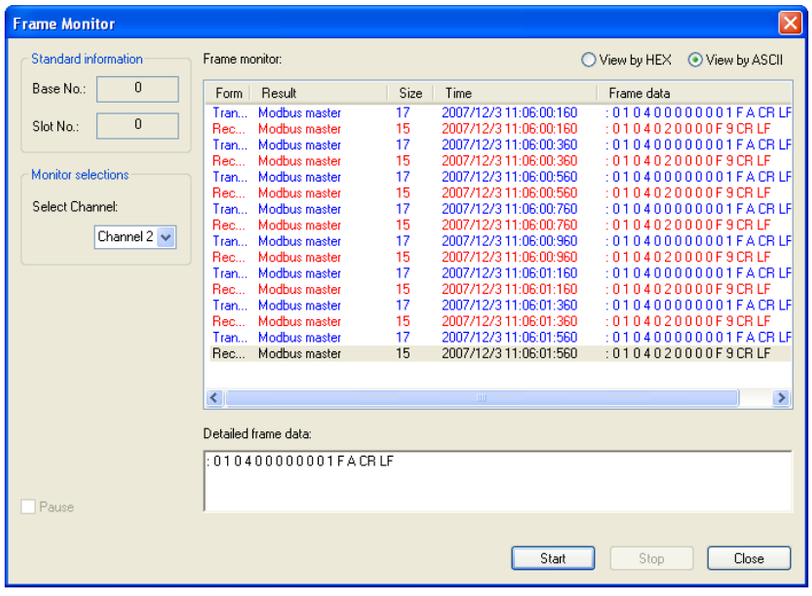
(1) Checking the operation

(a) Select [Online] – [System Diagnosis].
(b) Click the right button on the relevant module and click Frame Monitor



(2) Frame monitor

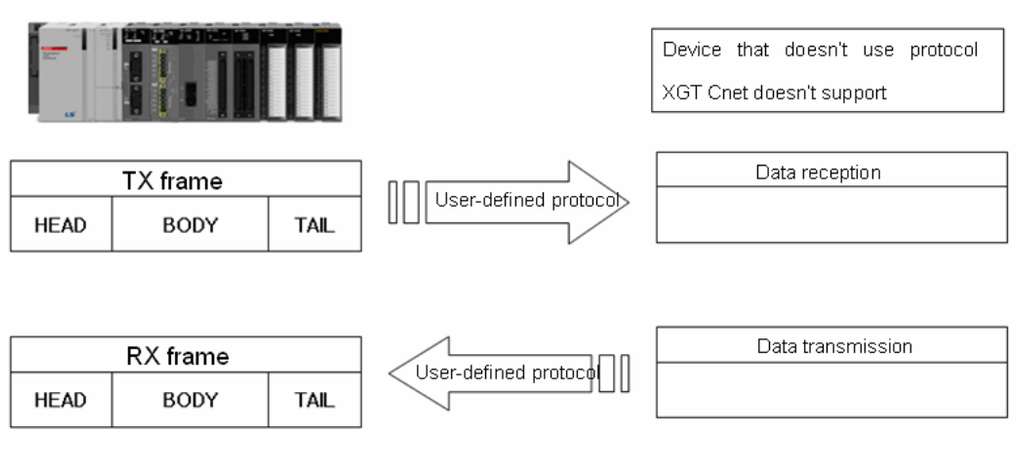
(a) Select channel to monitor.
(b) When protocol is Modbus ASCII mode, select View by ASCII
(c)When protocol is Modbus RTU mode, select View by Hex.
(d) Click Start.


Frame Monitor
Standard information
Base No.: 0
Slot No.: 0
Monitor selections
Select Channel:
Channel 2
Pause
Frame monitor:
View by HEX
View by ASCII
Form Result Size Time Frame data
Tran... Modbus master 17 2007/12/3 11:06:00:160 : 0 1 0 4 0 0 0 0 0 0 0 1 F A CR LF
Rec... Modbus master 15 2007/12/3 11:06:00:160 : 0 1 0 4 0 2 0 0 0 0 F 9 CR LF
Tran... Modbus master 17 2007/12/3 11:06:00:360 : 0 1 0 4 0 0 0 0 0 0 0 1 F A CR LF
Rec... Modbus master 15 2007/12/3 11:06:00:360 : 0 1 0 4 0 2 0 0 0 0 F 9 CR LF
Tran... Modbus master 17 2007/12/3 11:06:00:560 : 0 1 0 4 0 0 0 0 0 0 0 1 F A CR LF
Rec... Modbus master 15 2007/12/3 11:06:00:560 : 0 1 0 4 0 2 0 0 0 0 F 9 CR LF
Tran... Modbus master 17 2007/12/3 11:06:00:760 : 0 1 0 4 0 0 0 0 0 0 0 1 F A CR LF
Rec... Modbus master 15 2007/12/3 11:06:00:760 : 0 1 0 4 0 2 0 0 0 0 F 9 CR LF
Tran... Modbus master 17 2007/12/3 11:06:00:960 : 0 1 0 4 0 0 0 0 0 0 0 1 F A CR LF
Rec... Modbus master 15 2007/12/3 11:06:00:960 : 0 1 0 4 0 2 0 0 0 0 F 9 CR LF
Tran... Modbus master 17 2007/12/3 11:06:01:160 : 0 1 0 4 0 0 0 0 0 0 0 1 F A CR LF
Rec... Modbus master 15 2007/12/3 11:06:01:160 : 0 1 0 4 0 2 0 0 0 0 F 9 CR LF
Tran... Modbus master 17 2007/12/3 11:06:01:360 : 0 1 0 4 0 0 0 0 0 0 0 1 F A CR LF
Rec... Modbus master 15 2007/12/3 11:06:01:360 : 0 1 0 4 0 2 0 0 0 0 F 9 CR LF
Tran... Modbus master 17 2007/12/3 11:06:01:560 : 0 1 0 4 0 0 0 0 0 0 0 1 F A CR LF
Rec... Modbus master 15 2007/12/3 11:06:01:560 : 0 1 0 4 0 2 0 0 0 0 F 9 CR LF
Detailed frame data:
: 0 1 0 4 0 0 0 0 0 0 0 1 F A CR LF
Start
Stop
Close

Chapter 9 User-defined Communication

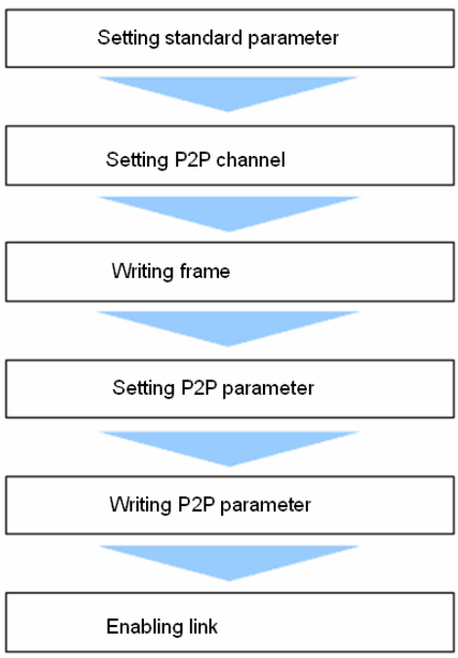
9.1 General

There are many protocols according to producer of communication device and it is impossible to supports diverse protocols. So if the user defines protocols and writes program, Cnet I/F module allows the communication between different devices according to defined protocol. In order to communicate with device which doesn't use specific protocols (XGT protocol, Modbus protocol), the user can directly define protocol used in the device the user want to communicate and communicate. At this time, the user should define TX and RX frame so that it meets partner device's protocol.



9.1.1 Procedure of user-defined communication

Procedure of user-defined communication is as follows.



9.2 Structure of user definition frame

When writing frame by user definition frame, frame is divided into HEAD, TAIL and BODY generally and each HEAD, TAIL and BODY is divided into segment. Total size of one frame should be less than 1024 byte.

Frame		
HEAD	BODY	TAIL
Segment 1	Segment 1	Segment 1
Segment 2	Segment 2	Segment 2
Segment 3	Segment 3	Segment 3
Segment N	Segment N	Segment N

9.2.1 Structure of HEAD

Input type of segment for HEAD is divided into numerical constant and string constant.
In case of numerical constant, it means HEX value and in case of string constant, it means ASCII value.

9.2.2 Structure of TAIL

Input type of segment for HEAD is divided into numerical constant, string constant and BCC which check frame error.
Meaning of numerical constant and string constant is same with HEAD’s. BCC is segment used for checking TRX frame error, only one can be set in the TAIL.

(1) BCC error check

When BCC is applied, calculation about TRX frame is executed and if calculation is different, relevant frame is ignored to improve the reliability of communication. Calculation methods about each BCC are as follows.

Classification	BCC method	Contents description
General method checking error	Byte SUM	Adds designated data as I byte unit and uses lower byte value
	Word SUM	Adds designated data as 1 word unit and uses lower word value
	Byte XOR	Executes Exclusive OR calculation about designated data as 1 byte unit and uses lower byte
	7bit SUM	Uses result value of byte sum except the most significant bit
	7bit XOR	Uses result value of byte XOR except the most significant bit
	7bit SUM#1	If result of 7 bit SUM is less than $20_{H,}$ it adds $20_{H.}$
	Byte SUM 2’S COMP	Takes 2’s complement about byte sum result
	Byte SUM 1’S COMP	Takes 1’s complement about byte sum result
	CRC 16	16 bit error detection method
Method checking error for dedicated communication	LGIS CRC	Error detection method used for LSIS PLC
	DLE AB	Error detection method used for DF1Protocol of Allen Bradley
	DLE SIEMENS	Error detection method used for Siemens 3964R communication

When setting BCC, in case of general method, the user need not set BCC setting range and indication method and in case of dedicated method, the user should set BCC setting range and indication method.

Item		Contents
Start position	Start area	Determines where BCC calculation starts from among HEAD/BODY/TAIL
	Segment	Determines segment location to start BCC calculation in HEAD/BODY/TAIL. 0 means first segment will be included in the BCC calculation
End position	Before BCC	Included from start position to before BCC
	End of area	Included from start position to end of designated area
	Settings	Included from start position to designated area segment
ASCII conversion		Converts result value, its size will be double
Initial value 0		Designates BCC initial value as 0. If there is no designation, initial value is FF_{H}.

9.2.3 Structure of BODY

Input type of segment which composes BODY is different according to reception and transmission.
In case of transmission, they are divided into string constant, numerical constant and fix sized variable. Meaning of string constant and numerical constant is same with HEAD's.

(1) Variable sized variable (in RX frame)

Part where size and contents changes are defined as variable sized variable. Variable sized variable can be set in the BODY and after variable sized variable, the user can't add segment. When using variable sized variable, there should be one among HEAD, TAIL. If the user registers variable sized variable without HEAD, TAIL, when receiving frame, there may be error according to communication status. For reliability of communication, register one among HEAD, TAIL. (In case of Variable sized variable of TX frame, the size is designated in P2P Block setting, so the function and characteristic is same with Fix sized variable of RX frame.)

(2) Fix sized variable (in RX frame)

Frame part where size is fixed but contents changes are defined as Fix sized variable. It can be set in the BODY. In case of Fix sized variable, the user can register up to 4.

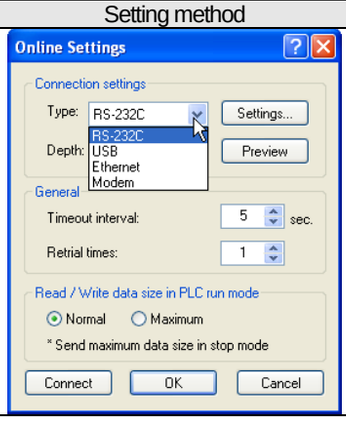
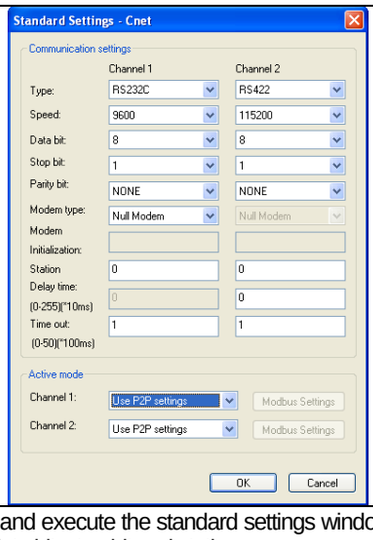
TRX frame standard for user - defined communication of XGT Cnet I/F module is as follows.

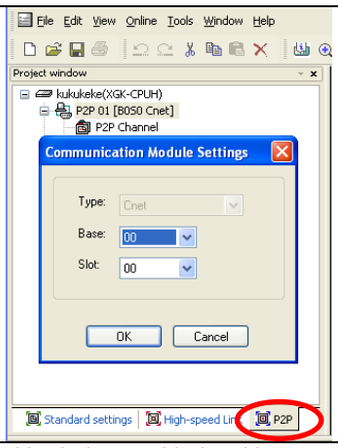
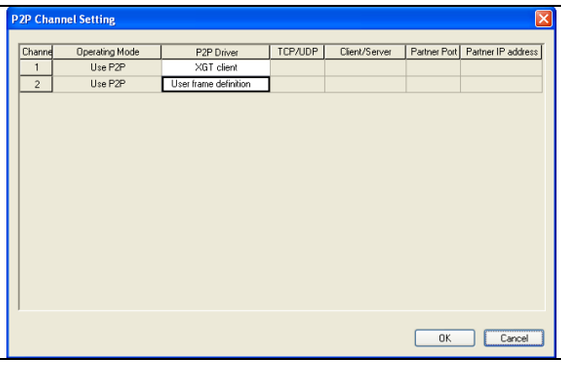
Group	Frame	Segment	Reference
TX frame	HEAD	Numerical constant	Max. 10 byte
		String constant	Max. 10 byte
	TAIL	Numerical constant	Max. 10 byte
		String constant	Max. 10 byte
		BCC	Only one BCC applicable
	BODY	Numerical constant	Max. 10 byte
		String constant	Max. 10 byte
		Variable sized variable	Available up to 4
RX frame	HEAD	Numerical constant	Max. 10 byte
		String constant	Max. 10 byte
	TAIL	Numerical constant	Max. 10 byte
		String constant	Max. 10 byte
		BCC	Only one BCC applicable
	BODY	Numerical constant	Max. 10 byte
		String constant	Max. 10 byte
		Fix sized variable	Available up to 4 Fix sized variable 3, variable sized variable 1 are available
		Variable sized variable	Only one variable sized variable available After variable sized variable, adding segment is impossible

9.3 Writing of frame

9.3.1 Standard setting for user-defined communication

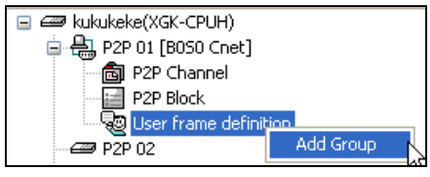
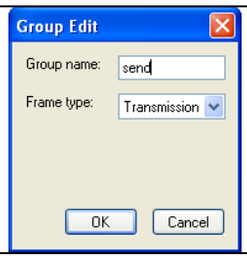
To use user-defined communication, select Use P2P settings like client.

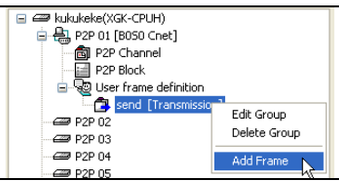
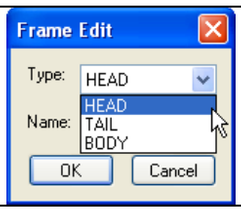
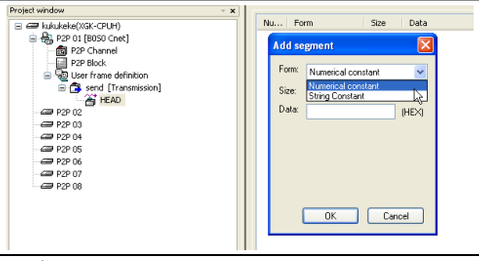
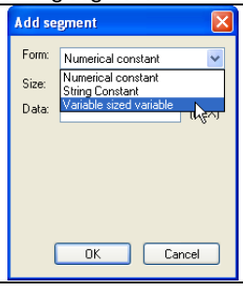
<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>Connection setting</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online]-[Connection Settings].
2. Click [Connect] after setting.</td></tr>
<tr><td>2</td><td>Reading I/O information</td><td>Select [Online] – [Read I/O Information]
Reads the information about currently equipped module</td></tr>
<tr><td rowspan="2">3</td><td>Standard Settings</td><td> 
</td></tr>
<tr><td colspan="2">1. Double-click the relevant Cnet I/F module and execute the standard settings window and designate the communication type, speed, modem type, data bit, stop bit and station.
2. Modem initialization is available in case of dial-up modem.
3. Delay time setting is available in case of RS-422/485 and time out setting is available in case of RS-422/485 P2P mode.</td></tr>
<tr><td>4</td><td>Selecting the active mode</td><td>Select ‘Use P2P settings’ to act as XGT client.</td></tr>
</table>

5	P2P settings	
	1. After selecting P2P setting window, double-clock P2P block address and input base and slot no. of communication module.	
6	P2P channel setting	
	1. Double-click P2P driver and select protocol according to each channel 2. Select User frame definition as P2P driver	

9.3.2 Writing transmission frame

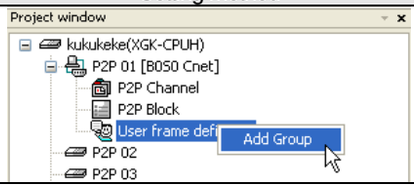
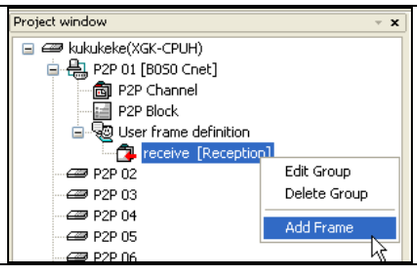
Frame is composed of HEAD indicating start, TAIL indicating end and BODY which is data area. How to write transmission frame is as follows.

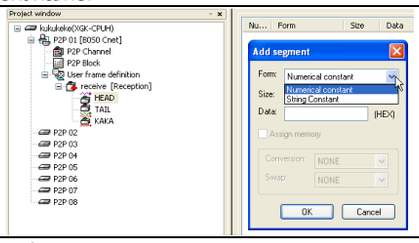
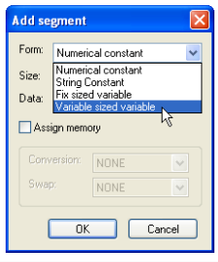
Sequence	Setting contents	Setting method
1	Writing user frame definition	
	1. Select User frame definition. 2. Click right button of mouse and click Add Group	
2	Creating frame	
	1. Group name is name of frame for user to write. 2. Select Transmission as frame type.	

<table>
<tr><td rowspan="2">3</td><td>Creating frame</td><td> 
</td></tr>
<tr><td colspan="2">1. Check creation of frame.
2. Select frame name and click right button of mouse.
3. Click Add Frame to create HEAD, TAIL and BODY.
4. Group Edit: when changing frame name.
5. Delete Group: when deleting frame.</td></tr>
<tr><td rowspan="2">4</td><td>Creating HEAD, TAIL, BODY</td><td> 
</td></tr>
<tr><td colspan="2">1. After clicking Add Frame, select type of frame.
2. type: HEAD,TAIL,BODY
3. Select HEAD.
4. To create TAIL, BODY, repeat step 3.
5. Name of frame edit window is activated when frame type is BODY.
6. Available to creating many BODYs with different name.</td></tr>
<tr><td rowspan="2">5</td><td>HEAD registration</td><td> 
</td></tr>
<tr><td colspan="2">1. Double-click HEAD. Then edit window is created.
2. Double-click edit window or click right button and select Add segment.
3. Select Form.
1) Numerical constant
(1) Defines numerical constant among frame
(2) Data value is always Hex (Hexadecimal)
2) String constant
(1) Registers string constant among frame
(2) Data value is always ASCII
4. Input value into Data.
Ex.) Form: Numerical constant
Data: 5(ENQ)
* When clicking the right button on the created segment, edit, deletion, insertion, copy, etc. are available.</td></tr>
<tr><td>6</td><td>TAIL registration</td><td>1. If double-click TAIL, edit window shows.
2. Setting method is same with step 5.
3. Add BCC is activated after inserting segment.</td></tr>
<tr><td>7</td><td>BODY registration</td><td> 
</td></tr>
</table>

	1. Double-click BODY and select data form. 1) Numerical constant and string constant are same as described above. 2) Variable sized variable (1) used when frame length change (2) available to insert up to 4 for one body (3) 'Assign memory' is checked automatically (4) Control by byte unit 3) Conversion ▶Hex To ASCII: converts the data red from PLC into ASCII and configures transmission frame ▶ASCII To Hex: converts the data red from PLC into Hex and configures transmission frame 4) Swap ▶2 Byte swap: 2 byte swap of data (ex.: 0x1234->0x3412) ▶4 Byte swap: 4 byte swap of data (ex.: 0x12345678->0x78564321) ▶8 Byte swap: 8 byte swap of data

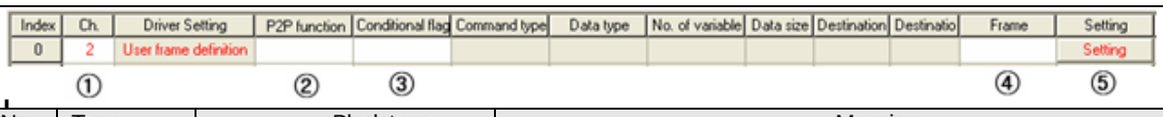
9.3.3 Writing reception frame

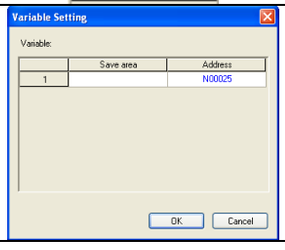
Sequence	Setting method	Setting method
1	Writing user-defined frame	
	1. Select User frame definition. 2. Click the right button of mouse and select Add Group.	
2	Creating frame	
	1. Group name is name of frame for user to write. 2. Select Reception as frame type.	
3	Creating frame	
	1. Check creation of frame. 2. Select frame name and click right button of mouse. 3. Click Add Frame to create HEAD, TAIL and BODY. 4. Group Edit: when changing frame name. 5. Delete Group: when deleting frame.	

<table>
<tr><td rowspan="2">4</td><td>Creating HEAD, TAIL, BODY</td><td>
</td></tr>
<tr><td colspan="2">1. After clicking Add Frame, select type of frame.
2. type: HEAD, TAIL, BODY
3. Select HEAD.
4. To create TAIL, BODY, repeat step 3.
5. Name of frame edit window is activated when frame type is BODY.
6. Available to creating many BODYs with different name.</td></tr>
<tr><td rowspan="2">5</td><td>HEAD registration</td><td> 
</td></tr>
<tr><td colspan="2">1. Double-click HEAD. Then edit window is created.
2. Double-click edit window or click right button and select Add segment.
3. Select Form.
1) Meaning of each form is same as described in the transmission.
4. Input value into Data.</td></tr>
<tr><td>6</td><td>TAIL registration</td><td>1. If double-click TAIL, edit window shows.
2. Setting method is same with step 5.
3. Add BCC is activated after inserting segment.</td></tr>
<tr><td rowspan="2">7</td><td>BODY registration</td><td> 
</td></tr>
<tr><td colspan="2">1. Double-click BODY and select data form.
1) Numerical constant and string constant are same as described above.
2) Variable sized variable
(1) used when frame length changes
(2) Available to insert only one variable sized variable and it is impossible to add segment after variable sized variable
(3) When checking [Assign memory], it is available to save in the PLC memory
(4) Control by byte unit
3) Fix sized variable
(1) Used when frame size is fixed.
(2) available to insert up to 4 for one body
(3) When checking [Assign memory], it is available to save in the PLC memory
4) Assign memory: when setting the device area of PLC to save data.
5) Conversion
▶Hex To ASCII: converts the data received into ASCII and configures reception frame
▶ASCII To Hex: converts the data received into Hex and configures reception frame
6) Swap
▶2 Byte swap: 2 byte swap of data (ex.: 0x1234->0x3412)
▶4 Byte swap: 4 byte swap of data (ex.: 0x12345678->0x78564321)
▶8 Byte swap: 8 byte swap of data</td></tr>
</table>

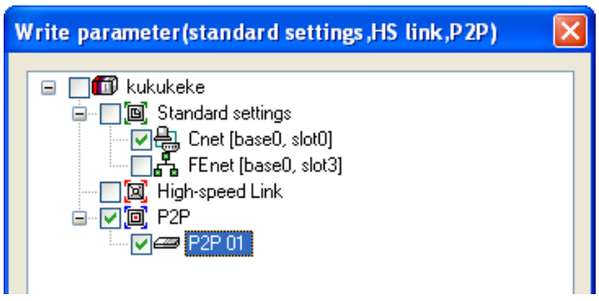
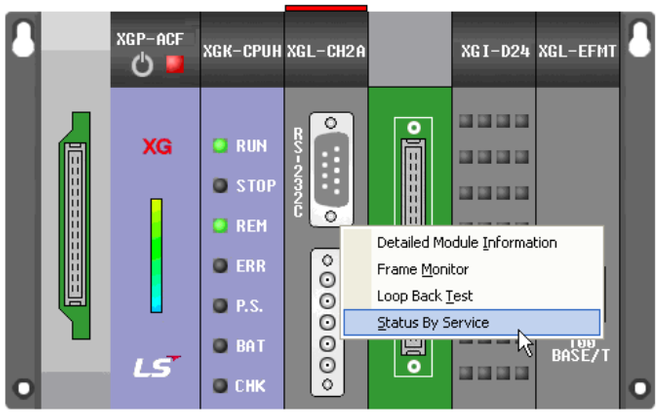
9.3.4 Setting parameter

To send and receive the user definition frame of XG-PD, the user should set the parameter by P2P block. How to set the P2P block is as follows.



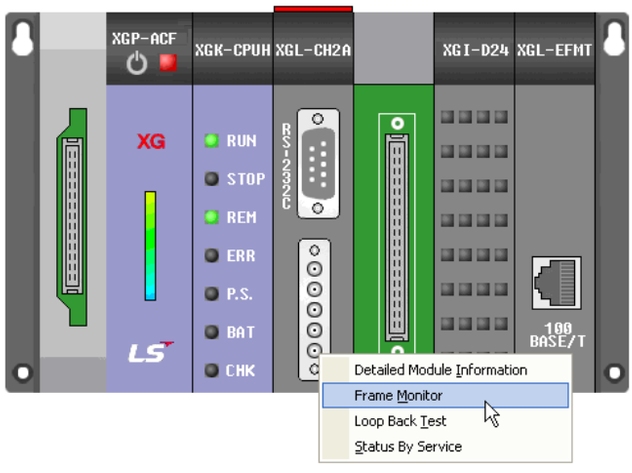
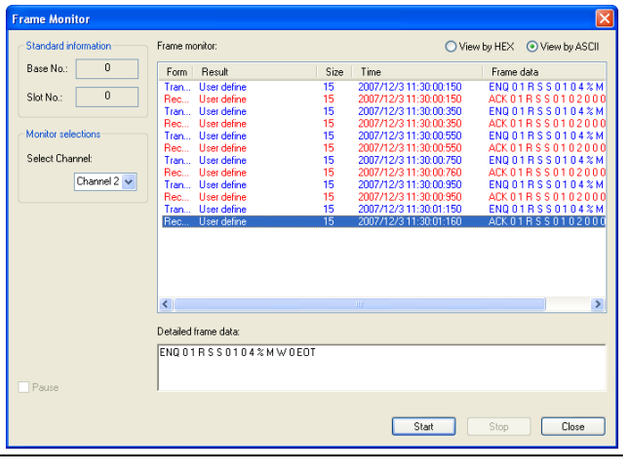
No.	Type	Block type	Meaning
1	Channel		Driver name changes according to driver set in the P2P Driver.
2	P2P Function		1. Receive: used when receiving the frame written according to partner's protocol 2. Send: used when sending the frame written according to partner's protocol
3	Conditional flag		1. Determines when Cent sends frame 2. It is activated when P2P function is [Send]. 3. In case of XGK type Ex.: F90(20ms flag), M01 4. In case of XGI type Ex.: _T20MS(20ms flag), %MX01
4	Frame		1. In case of selecting [SEND] in the P2P function, select body of transmission frame written in the user definition frame.
			1. In case of selecting [RECEIVE] in the P2P function, select body of reception frame written in the user definition frame.
5	Setting		1. Setting is available when [Assign memory] of Fix sized variable and variable sized variable is checked. 2. Save area: start address to save the data received from destination station.

9.3.5 Writing parameter

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>Writing parameter</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [Write Parameter].
2. Select the module in which parameter setting is completed.
3. After writing, reset the module.</td></tr>
<tr><td rowspan="2">2</td><td>Checking the operation</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [System Diagnosis].
2. Click the right button on the relevant module and click Frame Monitor or Status By Service.</td></tr>
</table>

9.4 Frame Monitor

The user can check the TRX frame of Cnet module by using the frame monitor.

Sequence	Procedure	Setting method
1	Checking the operation	
	1. Select [Online] – [System Diagnosis]. 2. Click the right button on the relevant module and click Frame Monitor	
2	Frame monitor	
	1. Select channel to monitor. 2. When protocol is ASCII, select View by ASCII. 3. When protocol is HEX, select View by HEX. 3. Press start to check frame.	

Chapter 10 Program Examples

10.1 Setting of Cnet I/F module in the XG-PD

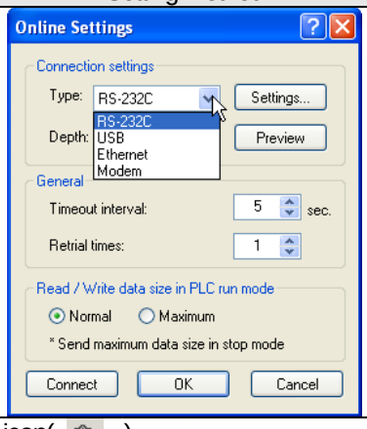
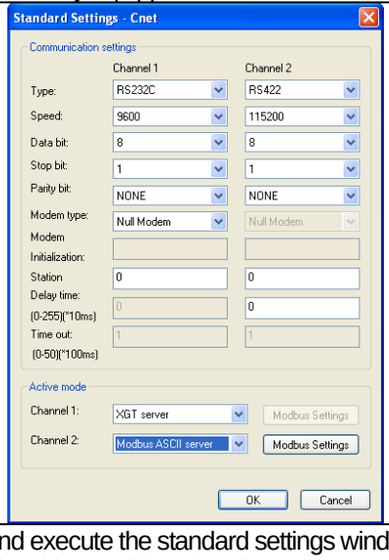
Operation of XGT Cnet I/F is divided into P2P service and Server.

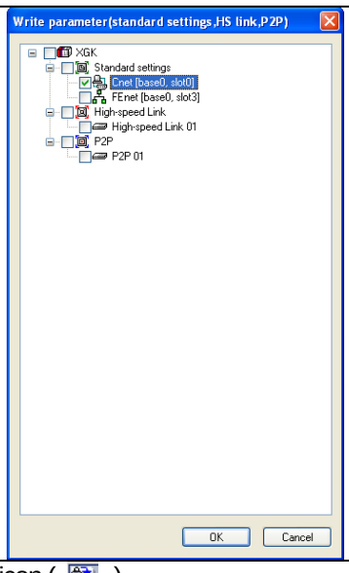
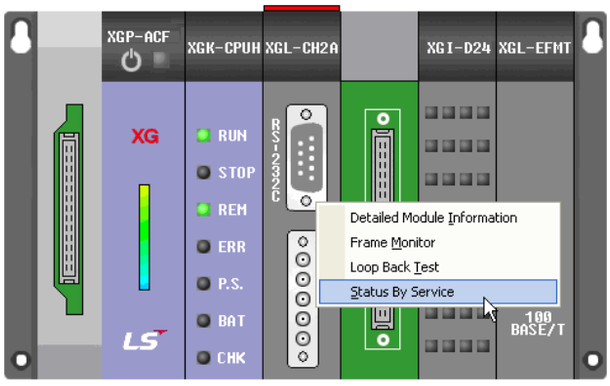
▶ P2P service: acts as client (master) and request reading/writing.
- ▷ XGT client
- ▷ Modbus RTU/ASCII client
- ▷ User frame definition

▶ Server: acts as server (slave) and acts according to request
- ▷ XGT server
- ▷ Modbus RTU server
- ▷ Modbus ASCII server

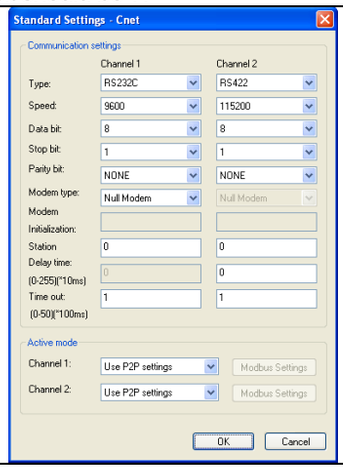
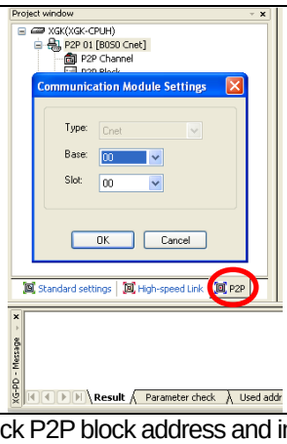
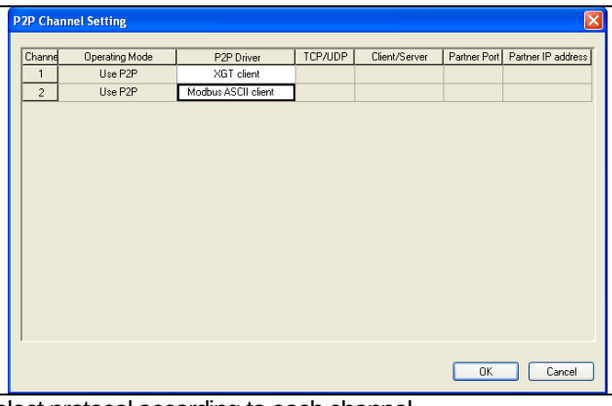
In case of setting Cnet I/F module as server, see 10.1.1 and in case of setting Cnet I/F module as P2P service, see 10.1.2 in the XG-PD.

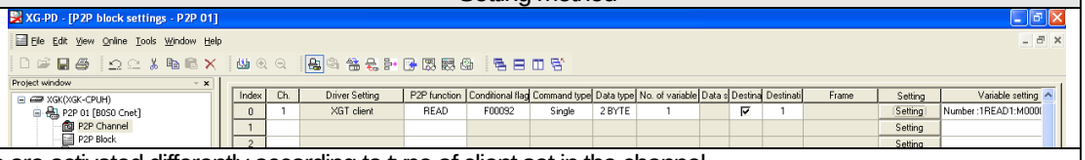
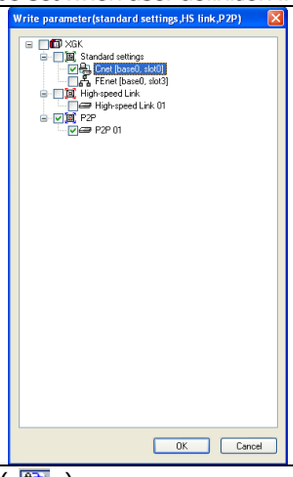
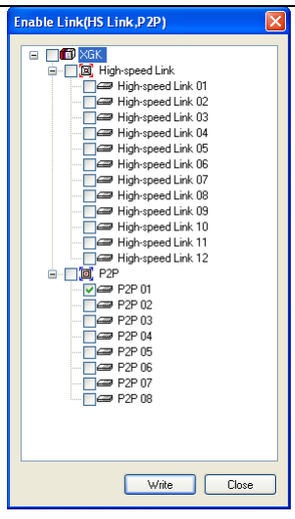
10.1.1 In case of acting as server

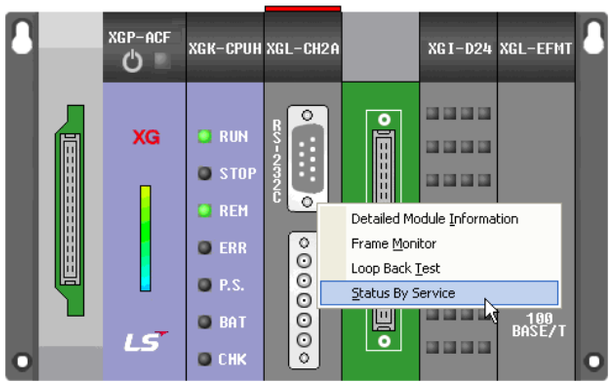
<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>Connection setting</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online]-[Connection Settings] or click icon( )
2. Click [Connect] after setting.</td></tr>
<tr><td>2</td><td>Reading I/O information</td><td colspan="2">Select [Online] – [Read I/O Information] or click icon ( )
Reads the information about currently equipped module.</td></tr>
<tr><td rowspan="2">3</td><td>Standard Settings</td><td> 
</td></tr>
<tr><td colspan="2">1. Double-click the relevant Cnet I/F module and execute the standard settings window and designate the communication type, speed, modem type, data bit, stop bit and station.
2. Modem initialization is available in case of dial-up modem.
3. Response waiting time: waiting time from sending to receiving
(1) Operation setting: Settable in case operation mode is Use P2P.
(2) basic response waiting time per communication speed
(a) 9,600~115,200bps : 100ms+(setting value×100ms)
(b) 7,200~2,400bps : 200ms+(setting value×100ms)
(c) 1,800~1,200bps : 400ms+(setting value×100ms)
(d) 600bps : 800ms+(setting value×100ms)
(e) 300bps : 1,200ms+(setting value×100ms)
4. Delay time setting: sends frame after delay time set by user
(a) Operation setting: settable in case communication type is RS-422/485
5. Delay time between character: In case of character coming within set time at one frame, it means character interval between character
(a) Operation setting: settable regardless of operation mode
* In case of acting as Modbus ASCII server, data bit should be 7.</td></tr>
</table>

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td>4</td><td>Selecting the active mode</td><td>1. Select active mode of server for user to use.
2. XGT Cnet I/F module supports XGT server, Modbus ASCII server, Modbus RTU server.</td></tr>
<tr><td rowspan="2">5</td><td>Writing parameter</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [Write Parameter] or click icon ( )
2. Select the module in which parameter setting is completed.
3. After writing, reset the module.</td></tr>
<tr><td rowspan="2">6</td><td>Checking the operation</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [System Diagnosis] or click icon ( ).
2. Click the right button on the relevant module and click Frame Monitor or Status By Service.</td></tr>
</table>

10.1.2 In case of acting as P2P service (client)

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td>1</td><td>Standard settings</td><td>1. Step 1~3 is same as described above.
*In case of ASCII client, data bit should be 7.</td></tr>
<tr><td rowspan="2">2</td><td>Active mode</td><td> 
</td></tr>
<tr><td colspan="2">1. Select Use P2P settings as active mode.</td></tr>
<tr><td rowspan="2">3</td><td>P2P settings</td><td> 
</td></tr>
<tr><td colspan="2">1. After selecting P2P setting window, double-clock P2P block address and input base and slot no. of communication module.</td></tr>
<tr><td rowspan="2">4</td><td>P2P channel setting</td><td> 
</td></tr>
<tr><td colspan="2">1. Double-click P2P driver and select protocol according to each channel
2. P2P driver supports user definition frame, XGT client, Modbus RTU/ASCII client.</td></tr>
</table>

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">5</td><td>P2P block setting</td><td> 
</td></tr>
<tr><td colspan="2">1. P2P items are activated differently according to type of client set in the channel.
2. Write shell according to protocol.
* In case of user definition frame, P2P block can be set when user definition frame is written.</td></tr>
<tr><td rowspan="2">6</td><td>Writing parameter</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [Write Parameter] or click icon ( ).
2. Select the module in which parameter setting is completed and click OK.
3. After writing, reset the module.</td></tr>
<tr><td rowspan="2">7</td><td>Enabling the link</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [Enable Link] or click icon ( ).
2. Click the P2P to enable and click Write.</td></tr>
</table>

Sequence	Procedure	Setting method
8	Checking the operation	
	1. Select [Online] – [System Diagnosis] or click icon ( ). 2. Click the right button on the relevant module and click Frame Monitor or Status By Service.	

10.2 XGT Communication

What is XGT communication?

▶ Protocol defined by LSIS, which is divided into XGT client and XGT server.

▶ XGT Client: requests reading/writing data

▶ XGT server: answer to request of client

System configuration and operation of dedicated service

▶ System configuration

[Figure 10.1] example of dedicated system configuration

▶ Mount XGL-CH2A on no. 0 slot of each PLC

▶ Dedicated service at channel 1

▶ Settings of client

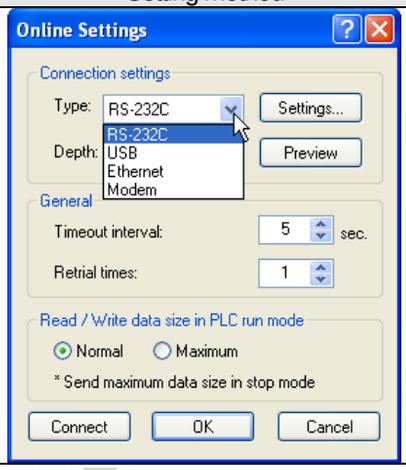
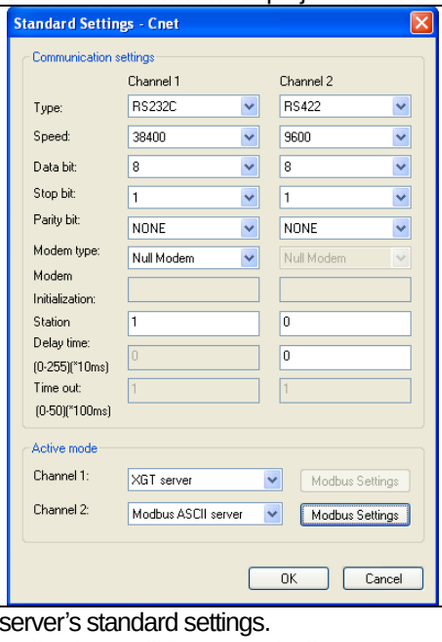
Type		Setting content
CPU		XGK-CPUH
Type		RS-232C
Speed		38,400
Data bit		8
Stop bit		1
Parity bit		No
Modem type		No
Conditional flag		200ms
Operation	Writing	Write 1 word of M100 of client to M100 of server
	Reading	Read 1 word of D100 of server and save it in M110 of client

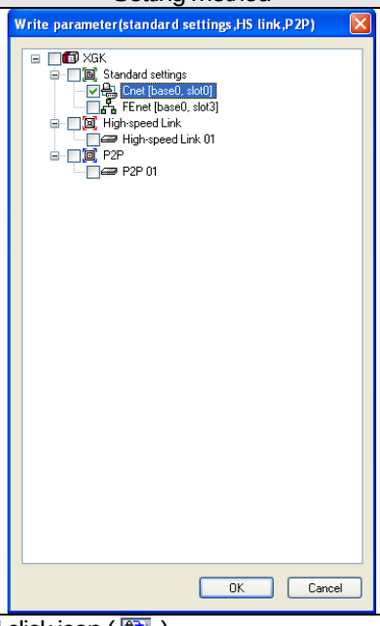
▶ Settings of server

Type	Setting content
CPU	XGK-CPUH
Type	RS-232C
Speed	38,400
Data bit	8
Stop bit	1
Parity bit	No
Modem type	No
Station no.	1

10.2.1 Settings of XGT server

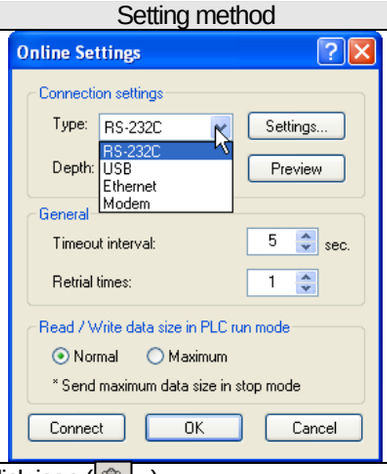
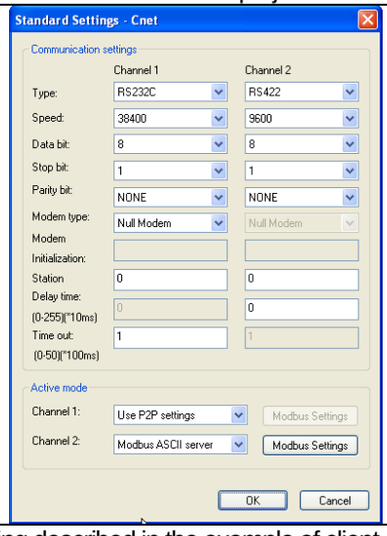
Setting methods of above settings are as follows. (in case of server)

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>Connection settings</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online]-[Connection settings] and click ( ).
2. After setting the connection option according to user, click the ‘connection’.</td></tr>
<tr><td>2</td><td>Reading IO information</td><td>Select [Online]-[Read IO Information] and click icon ( ).
IO information of currently mounted is shown on the project window.</td></tr>
<tr><td rowspan="2">3</td><td>Standard settings</td><td> 
</td></tr>
<tr><td colspan="2">1. Set standard settings to be same with server’s standard settings.
2. Set active mode as XGT server because it acts as XGT communication service.</td></tr>
</table>

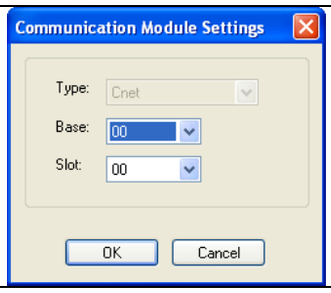
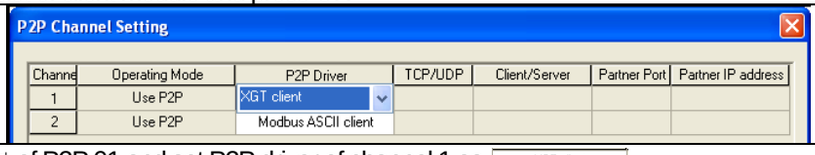
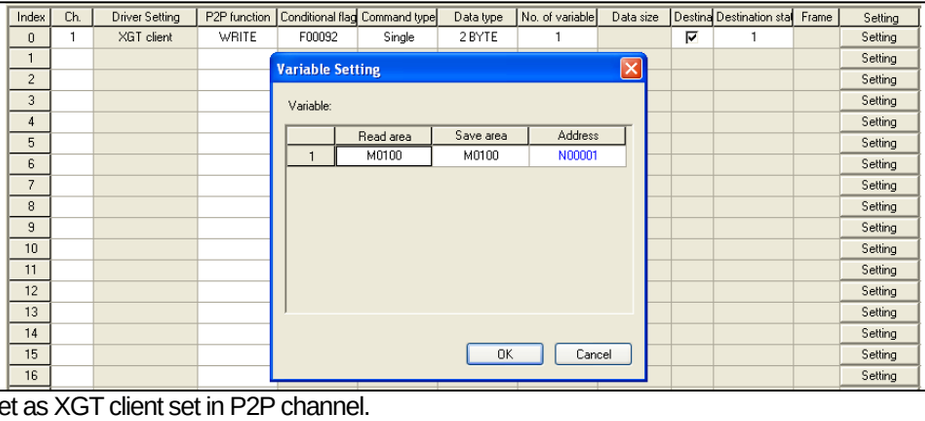
<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">5</td><td>Writing the parameter</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [Write Parameter] and click icon ( )
2. Select the module in which parameter setting is completed.
3. After writing, reset the module.</td></tr>
</table>

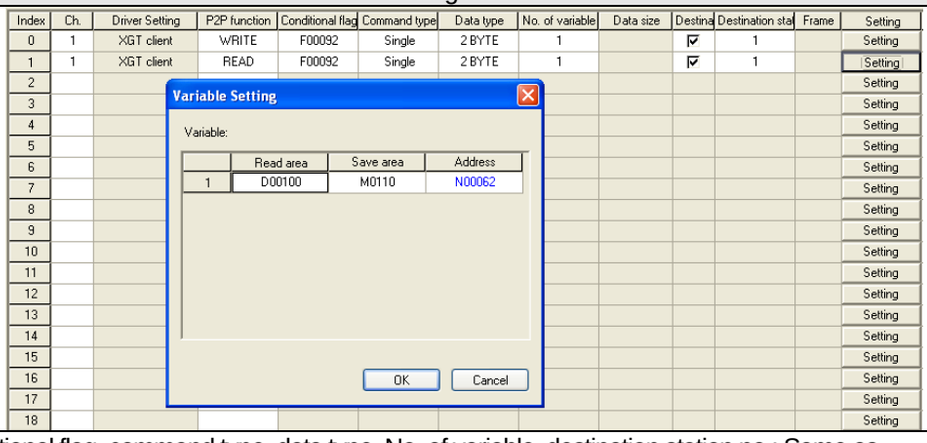
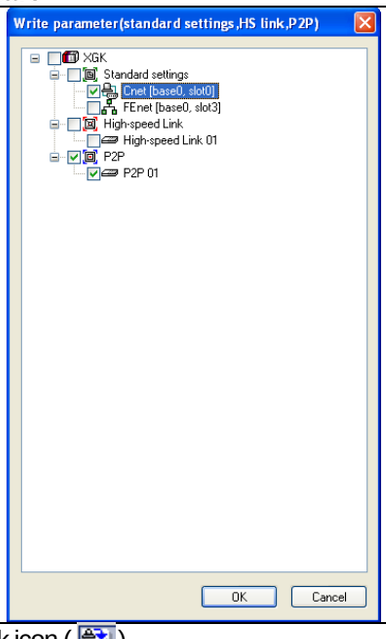
10.2.2 Settings when acting as XGT client

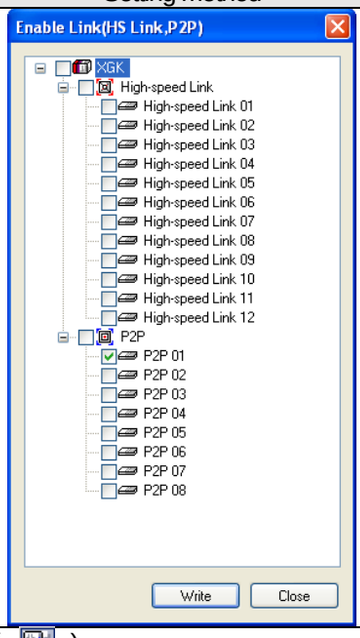
To operate XGT client, standard settings of Cnet I/F should be done first. Sequences of standard settings are as follows.

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>Connection setting</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online]-[Connection settings] or click icon ( ).
2. After setting the connection option according to user, click the ‘connection’.</td></tr>
<tr><td>2</td><td>Reading IO information</td><td>Select [Online]-[Read IO Information] and click icon ( ).
IO information of currently mounted is shown on the project window.</td></tr>
<tr><td rowspan="2">3</td><td>Standard settings</td><td> 
</td></tr>
<tr><td colspan="2">1. Set standard setting to be same with setting described in the example of client above.
2. Since station no. of client doesn’t have meaning, select temporary station no. (0~31)
3. When acting as client mode, active mode should be Use P2P settings.</td></tr>
</table>

After standard settings, P2P channel and P2P block should be set. Setting methods are as follows.

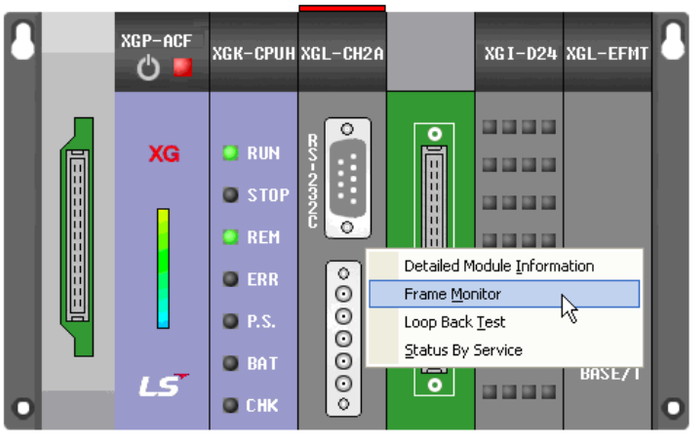
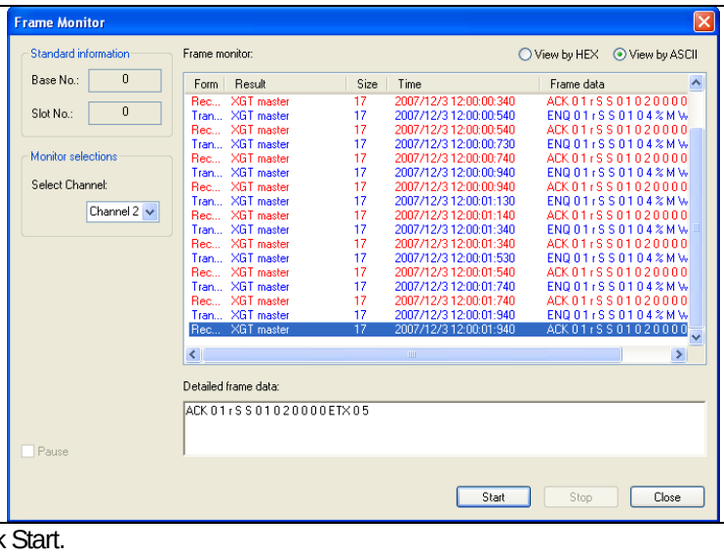
<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td>1</td><td>P2P setting</td><td>Click P2P bottom of project window.</td></tr>
<tr><td rowspan="2">2</td><td>Communication module settings</td><td> 
</td></tr>
<tr><td colspan="2">1. Double-click P2P 01 of project window.
2. select no. of base and slot of client module and press OK</td></tr>
<tr><td rowspan="2">3</td><td>P2P channel setting</td><td> 
</td></tr>
<tr><td colspan="2">1. Double-click P2P Channel of P2P 01 and set P2P driver of channel 1 as XGT client</td></tr>
<tr><td>4</td><td colspan="2">1. Double-click P2P Block of P2P 01.</td></tr>
<tr><td rowspan="2">5</td><td>Setting of writing operation</td><td> 
</td></tr>
<tr><td colspan="2">1. Ch.: Select ch.1 set as XGT client set in P2P channel.
2. P2P function: select WRITE.
3. Conditional flag: to send frame every 200ms, use flag F92.
4. Command type, Data type: to write 1 word, select single and 2 byte.
5. No. of variable: since no. of word is 1, select 1.
6. Destination station number: select station number of server.
7. Setting: after setting Read area and Save area, click OK.
1) Read area: device address of data saved in the client
2) Save area: device address of server to save data
* If all settings are completed, color of index of channel becomes black.</td></tr>
</table>

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">6</td><td>Setting of reading operation</td><td> 
</td></tr>
<tr><td colspan="2">1. Channel, conditional flag, command type, data type, No. of variable, destination station no.: Same as described in setting is writing.
2. P2P function: select READ.
3. Setting: set Read area and Save area.
1) Read area: device address of data saved in server
2) Save area: device address of client to save</td></tr>
<tr><td rowspan="2">7</td><td>Writing parameter</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [Write Parameter] or click icon ( ).
2. Select the module to write and click OK
3. Reset the module.</td></tr>
</table>

Sequence	Procedure	Setting method
8	Enabling the link	
9	1. Select [Online] – [Enable Link] or click icon ( ) 2. Click the P2P to enable and click Write.	

10.2.3 Checking the operation

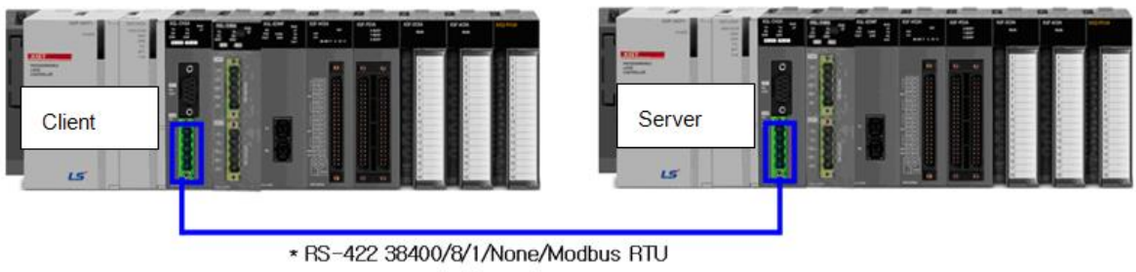
The user can analyze frame by using the frame monitor of XG-PD to check it communication is normal or not. Method of frame monitor of Cnet I/F module is same regardless of protocol.

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>System Diagnosis</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [System Diagnosis] or click ( ).
2. Click the right button on the relevant module and click Frame Monitor or Status By Service.</td></tr>
<tr><td rowspan="2">2</td><td>Frame monitor</td><td> 
</td></tr>
<tr><td colspan="2">1. Select channel1 and click Start.
2. Since dedicated service is ASCII communication, select View by ASCII.
* In case of Modbus RTU, select View by HEX and in case of Modbus ASCII, select View by ASCII.</td></tr>
</table>

10.3 Modbus Communication

System configuration and operation of Modbus communication (Modbus RTU mode) example

▶ System configuration



[Figure 10.2] XGT Modbus communication system configuration example

▶ Mount XGL-CH2A on no. 0 slot of each PLC

▶ Modbus communication at channel 2 of each PLC

▶ Settings of client

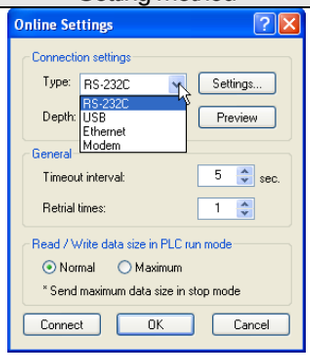
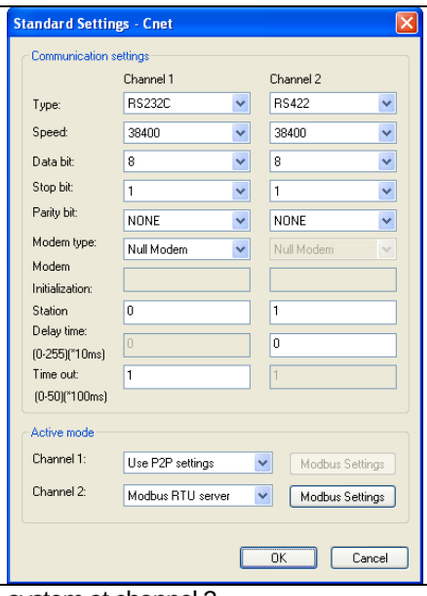
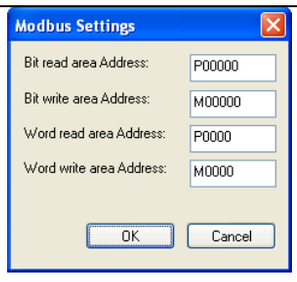
CPU		XGK-CPUH
Type		RS-422
Speed		38,400
Data bit		8
Stop bit		1
Parity bit		No
Modem type		No
Conditional flag		200ms
Operation	Writing	▶Write 1 word of M100 of client to M1 of server ▶Write 4 words from D0 of client to M2~M5 of server ▶Write 15th bit of M2 to 2nd bit of M20 of server ▶Write 0~15th bit of M2 to 0~15th bit of M21 of server
	Reading	▶Read 1 word of M2 of server and save it at M160 of client ▶Read 4 words from P0 of server and save it at M150~M153 ▶Read 1st bit of P2 of server and save it at 1st bit of M170. ▶Read 0th ~ 15th bit of M10 of server and save it at 0th ~ 15th of M180 of client.

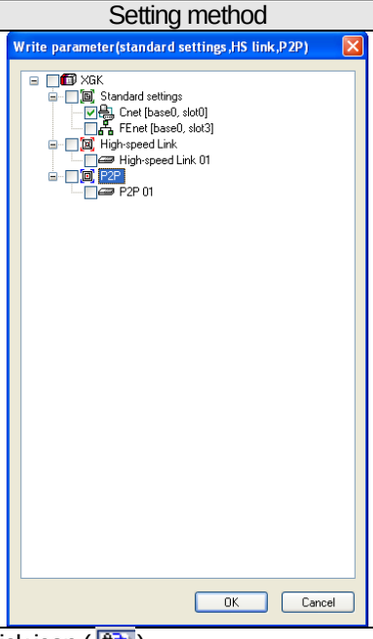
▶ Settings of server

CPU		XGK-CPUH
Type		RS-422
Speed		38,400
Data bit		8
Stop bit		1
Parity bit		No
Modem type		No
Station no.		1
Start area	Bit read area Address	P0
	Bit write area Address	M0
	Word write area Address	P0
	Word write area Address	M0

10.3.1 Settings when acting as Modbus RTU server

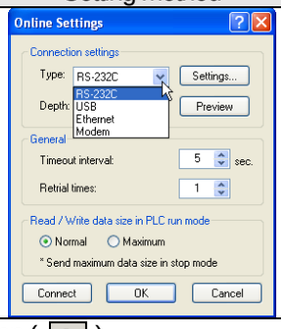
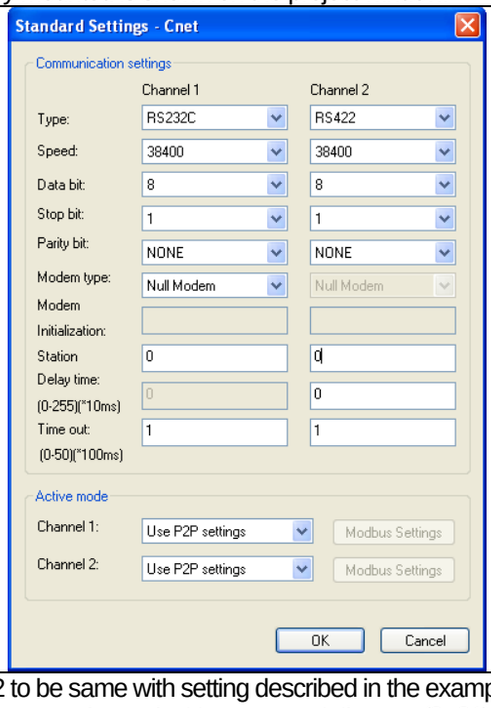
Standard settings are as follows to act as Modbus RTU server.

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>Connection setting</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online]-[Connection settings] or click icon ( ).
2. After setting the connection option according to user, click the ‘connection’.</td></tr>
<tr><td>2</td><td>Reading IO information</td><td>Select [Online]-[Read IO Information] and click icon ( ).
IO information of currently mounted is shown on the project window.</td></tr>
<tr><td rowspan="2">3</td><td>Standard settings</td><td> 
</td></tr>
<tr><td colspan="2">1. Write setting value of sever of example system at channel 2.
2. Set active mode as Modbus RTU server.</td></tr>
<tr><td rowspan="2">5</td><td>Modbus setting</td><td> 
</td></tr>
<tr><td colspan="2">1. Bit read area Address: P00000 2. Bit write area Address: M0000
3. Word read area Address: P0000 4. Word write area Address: M0000
* In the Bit read/write area Address, upper 4 digit is word address and the last digit is bit address
(P00110: 0th bit of P11th word)</td></tr>
</table>

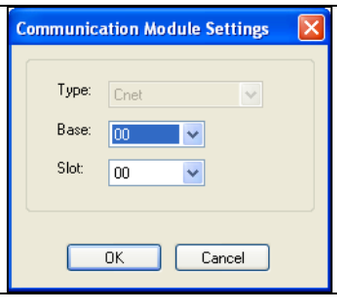
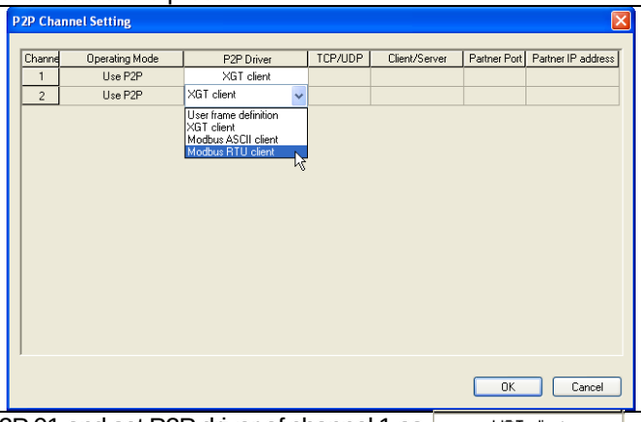
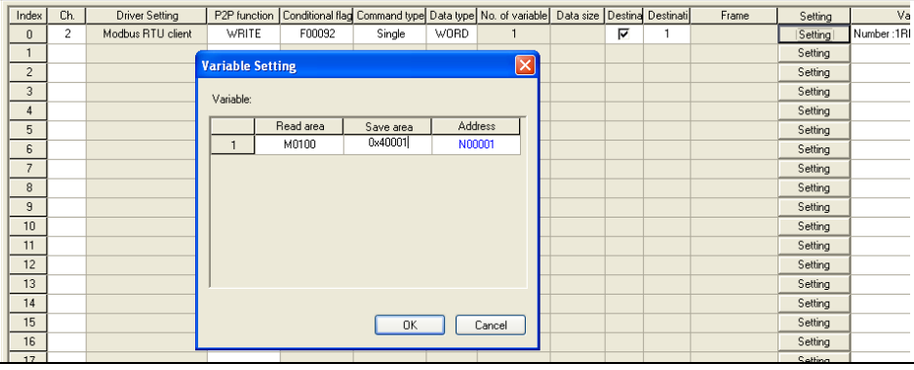
Sequence	Procedure	Setting method
6	Writing parameter	
	1. Select [Online] – [Write Parameter] or click icon ( ). 2. Select the module to write and click OK 3. Reset the module.	

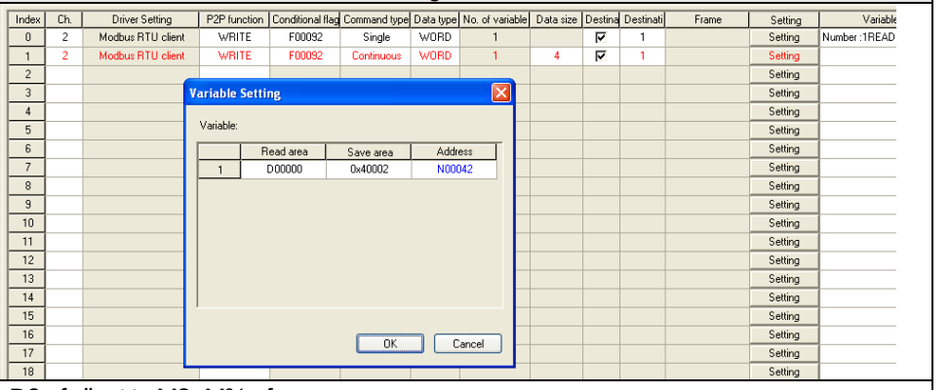
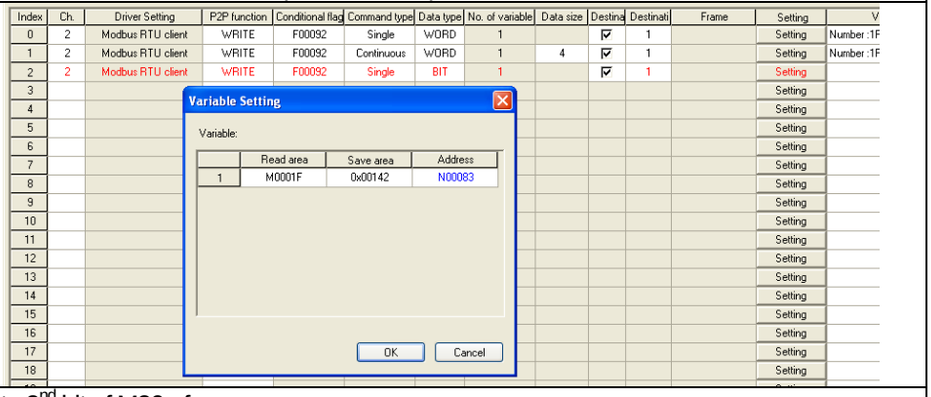
10.3.2 Setting when acting as RTU client

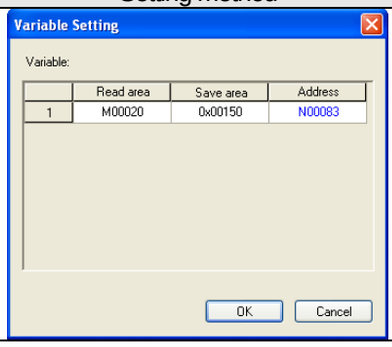
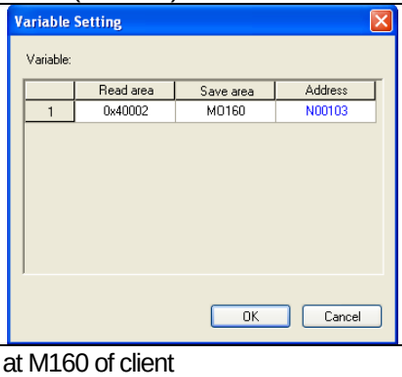
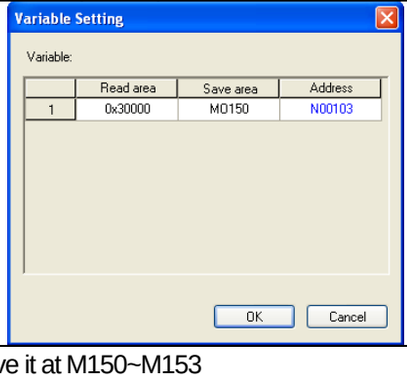
Standard settings are as follows to act as Modbus RTU client.

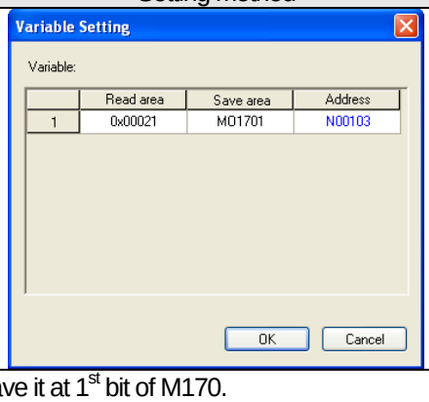
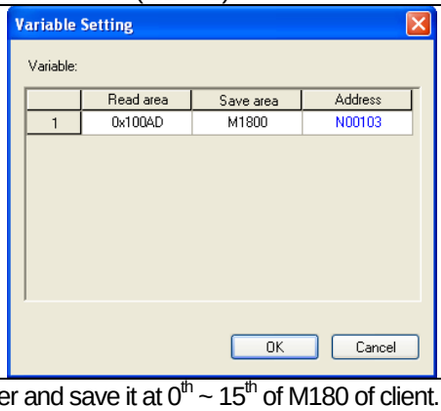
<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>Connection setting</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online]-[Connection settings] or click icon ( ).
2. After setting the connection option according to user, click the ‘connection’.</td></tr>
<tr><td>2</td><td>Reading IO information</td><td colspan="2">Select [Online]-[Read IO Information] and click icon ( ).
IO information of currently mounted is shown on the project window.</td></tr>
<tr><td rowspan="2">3</td><td>Standard settings</td><td> 
</td></tr>
<tr><td colspan="2">1. Set standard setting at the channel 2 to be same with setting described in the example of client above.
2. Since station no. of client doesn’t have meaning, select temporary station no. (0~31)
3. When acting as client mode, active mode should be Use P2P settings.</td></tr>
</table>

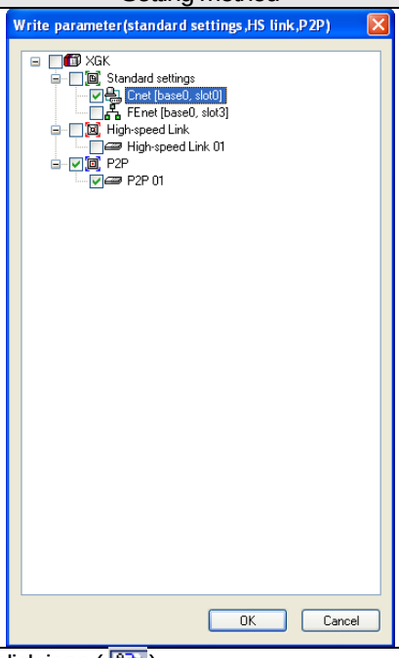
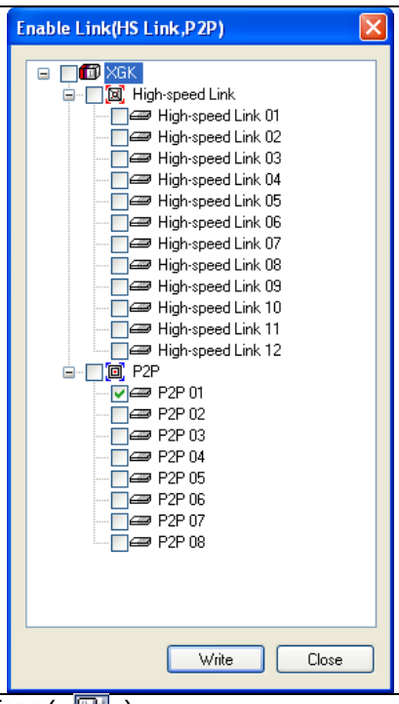
After standard settings, P2P channel and P2P block should be set. Setting methods are as follows.

Sequence	Procedure	Setting method
1	P2P setting	Click P2P bottom of project window.
2	Communication module setting	
	1. Double-click P2P 01 of project window. 2. select no. of base and slot of client module and press OK	
3	P2P channel setting	
	1. Double-click P2P Channel of P2P 01 and set P2P driver of channel 1 as XGT client	
4	1. Double-click P2P Block of P2P 01.	
5	Setting of writing operation (1)	
	▶Write 1 word of M100 of client to M1 of server 1. Ch.: Select ch.2 set as Modbus RTU client set in P2P channel. 2. P2P function: select WRITE. 3. Conditional flag: to send frame every 200ms, use flag F92. 4. Command type, Data type: to write 1 word, select single and 2 byte. 5. Destination station number: select station number of server. 6. Setting: after setting Read area and Save area, click OK. (1) Read area: device address saved in the client (M100) (2) Save area: deice address of server to save (0x40001: M1) * If all settings are completed, color of index of channel becomes black.	

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">6</td><td>Setting of writing operation (2)</td><td> 
</td></tr>
<tr><td colspan="2">▶ Write 4 words from D0 of client to M2~M% of server
1. Ch., P2P function, conditional flag, destination station no.: same with step 5
2. Command type, Data type: because of writing continuous 4words, select Continuous, WORD
3. Data size: because of 4 words, input 4
4. Setting: after setting Read area and Save area, click OK.
(1) Read area: device address saved in the client (D0)
(2) Save area: deice address of server to save (0x40002 : M2)</td></tr>
<tr><td rowspan="2">7</td><td>Setting of writing operation (3)</td><td> 
</td></tr>
<tr><td colspan="2">▶ Write 15th bit of M2 to 2nd bit of M20 of server
1. Ch., P2P function, conditional flag, destination station no.: same with step 5
2. Data type: select bit
3. Setting: after setting Read area and Save area, click OK.
(1) Read area: device address saved in the client (M1.F : 15th bit of M1)
(2) Save area: deice address of server to save (0x00142: 2nd bit of M20)
* When inputting M1.F, it is converted into M0001F in the XG-PD.
* Device address of server is Hex value.</td></tr>
</table>

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">8</td><td>Setting of writing operation (4)</td><td> 
</td></tr>
<tr><td colspan="2">▶ Write 0~15th bit of M2 to 0~15th bit of M21 of server
1. Ch., P2P function, conditional flag, destination station no.: same with step 7
2. Command type: select continuous.
3. Setting: after setting Read area and Save area, click OK.
(1) Read area: device address saved in the client (M2.0)
(2) Save area: deice address of server to save (0x00150)</td></tr>
<tr><td rowspan="2">9</td><td>Setting of reading operation (1)</td><td> 
</td></tr>
<tr><td colspan="2">▶ Read 1 word of M2 of server and save it at M160 of client
1. Ch., Conditional flag, Command type, Data type, Destination station no.: same with step 5
2. P2P function: select READ
3. Setting: after setting Read area and Save area, click OK.
(1) Read area: device address saved in server (0x40002)
(2) Save area: device address of client to save (M0160)</td></tr>
<tr><td rowspan="2">10</td><td>Setting of reading operation (2)</td><td> 
</td></tr>
<tr><td colspan="2">▶ Read 4 words from P0 of server and save it at M150~M153
1. Ch., Conditional flag, Command type, Data type, Destination station no.: same with step 6
2. P2P function: select READ.
3. Setting: after setting Read area and Save area, click OK.
(1) Read area: device address saved in server (0x30000)
(2) Save area: device address of client to save (M0150)</td></tr>
</table>

<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">11</td><td>Setting of reading operation (3)</td><td> 
</td></tr>
<tr><td colspan="2">▶ Read 1st bit of P2 of server and save it at 1st bit of M170.
1. Ch., Conditional flag, Command type, Data type, Destination station no.: same with step 7
2. P2P function: select READ
3. Setting: after setting Read area and Save area, click OK.
(1) Read area: device address saved in server (0x00021)
(2) Save area: device address of client to save (M170.1)</td></tr>
<tr><td rowspan="2">12</td><td>Setting of reading operation (4)</td><td> 
</td></tr>
<tr><td colspan="2">▶ Read 0th ~ 15th bit of M10 of server and save it at 0th ~ 15th of M180 of client.
1. Ch., Conditional flag, Command type, Data type, Destination station no.: same with step 8
2. P2P function: select READ
3. Setting: after setting Read area and Save area, click OK.
(1) Read area: device address saved in server (0x100A0)
(2) Save area: device address of client to save (M180.0)</td></tr>
</table>

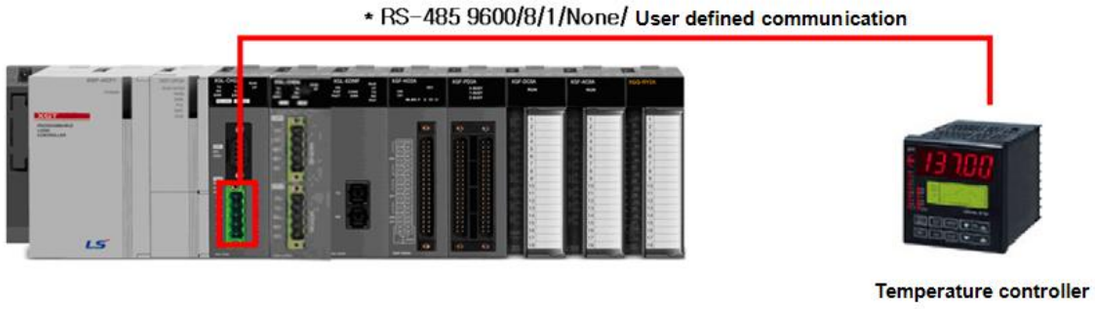
<table>
<tr><th>Sequence</th><th>Procedure</th><th>Setting method</th></tr>
<tr><td rowspan="2">13</td><td>Writing parameter</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [Write Parameter] or click icon ( ).
2. Select the standard setting and P2P set as Modbus RTU client to write and click OK
3. Reset the module.</td></tr>
<tr><td rowspan="2">14</td><td>Enabling the link</td><td> 
</td></tr>
<tr><td colspan="2">1. Select [Online] – [Enable Link] or click icon ( )
2. Click the P2P to enable and click Write.</td></tr>
</table>

10.4 User - defined Communication

10.4.1 Communication with other producer's product

When communication with device of which protocol is not supported by Cnet I/F module client, how to use user-defined communication is described in the system like [Figure 10.3] below.

▶ System configuration



[Figure 10.3] configuration of user-defined communication system

▶ System configuration

Describes operation between Cnet I/F module and partner device (Temperature controller)

Device name	CPU	XGI-CPUU	Han-Young temperature controller PX7
	Communication module	XGL-CH2A	
Operation mode	Client		Server
Protocol	User frame definition		PC Link
Type	RS-485		RS-485
Speed	9,600		9,600
Data bit	8		8
Stop bit	1		1
Parity bit	None		None
Station no.	0		1
Delay time*note1)	100ms		-
Operation	Reads present value and setting value from temperature controller every second and saves present value at %MB200 and setting value at %MB210.		

Note 1) Delay time is set to prevent from frame error when communication with device of which response is slow in case of RS-422/485 communication. It varies according to partner device and it has 50~100ms value generally.

▶ Frame structure of PC Link

Frame of temperature is executed by ASCII string and can read/write defined D, I register. There are two protocols, STD standard protocol and SUM protocol adding Check Sum to standard protocol. Selection of protocol type is determined by parameter of temperature controller. Standard protocol is "STD". It starts with STX (0x02) and ends with CR (0x0D) LF (0x0A). [Table 10.3.1] is standard protocol and [Table 10.3.2] is Sum protocol.

STX	Station no.	Command	Data	CR	LF
0x02	1~99			0x0D	0x0A

[Table 10.3.1] structure of standard protocol

STX	Station no.	Command	Data	Error code	CR	LF
0x02	1~99			Check Sum	0x0D	0x0A

[Table 10.3.2] structure of SUM protocol

▶ Writing example frame

In this example, present value and setting value is saved in M device area of PLC. [Table 10.3.3] is frame requesting continuous data and [Table 10.3.4] is frame responding to request.

Frame	STX	Station no.	DRS	,	No. of data	Start address of D register	CR	LF
(Byte)	1	2	3	1	2	4	1	1

[Table 10.3.3] request frame

▷ DRS: command that request reading continuous D register value. No of data and start address of D register is necessary.

▷ In the example, no. of data is 2 and start address is 01.

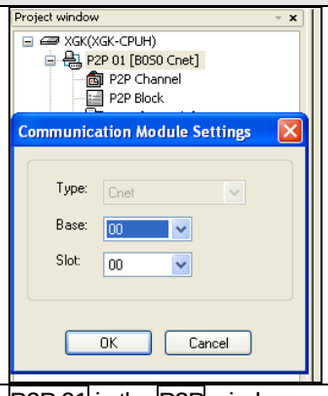
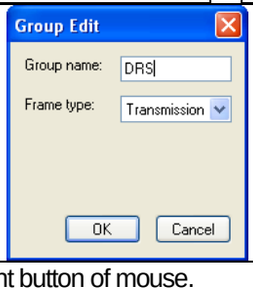
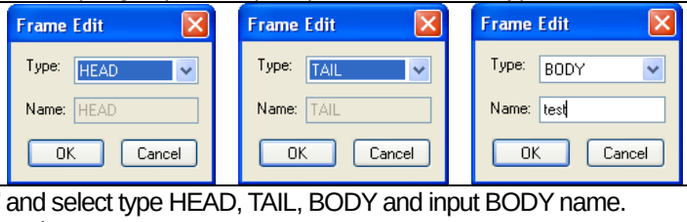
Frame	STX	Station no.	DRS	,	OK	,	Data 1	,	Data N	CR	LF
Size (Byte)	1	2	3	1	2	1	4	1	4	1	1

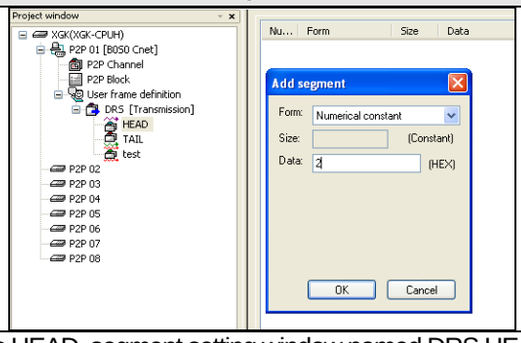
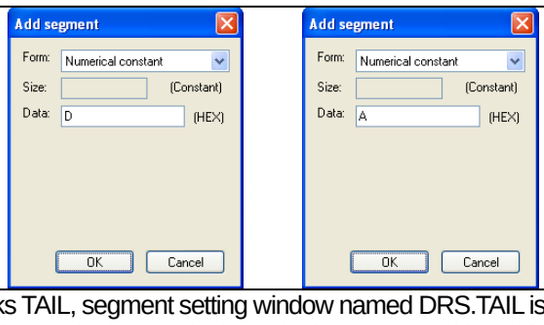
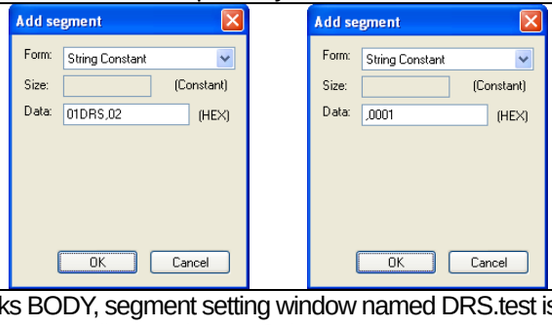
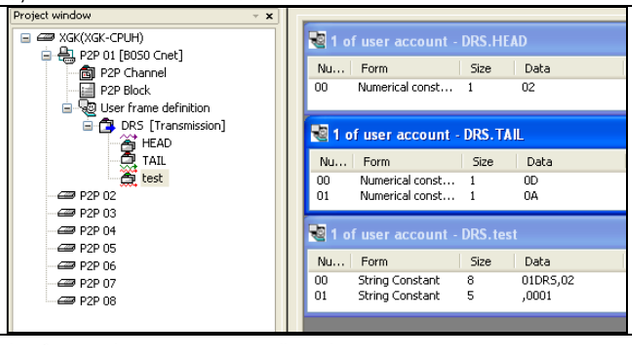
[Table 10.3.4] response frame

▶ Standard settings

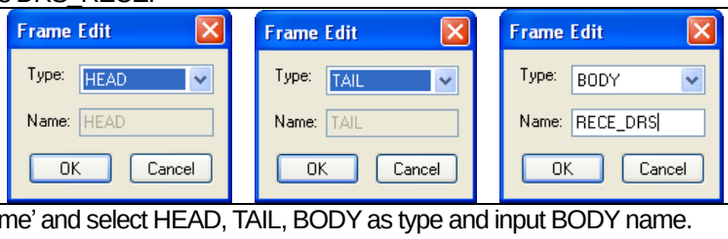
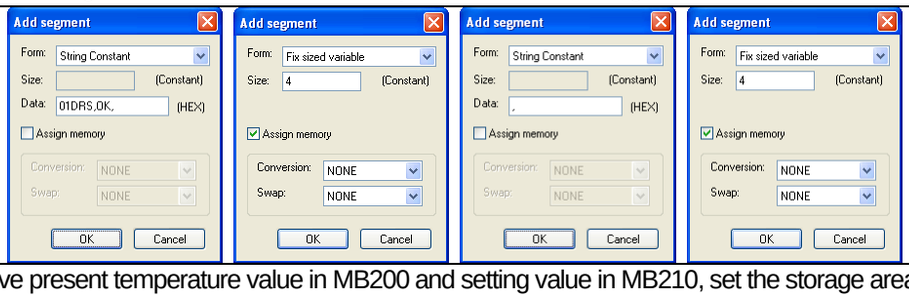
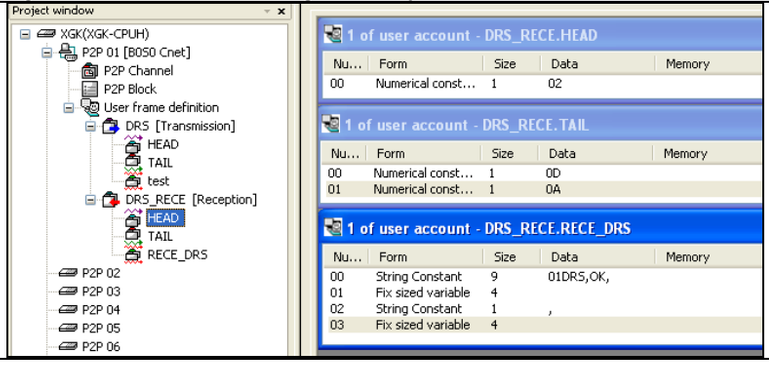
For standard setting, refer to setting method when acting as P2P service of 10.1.2 and configure above system.

▶Writing frame that requests reading data
Describes how to write frame in XG-PD

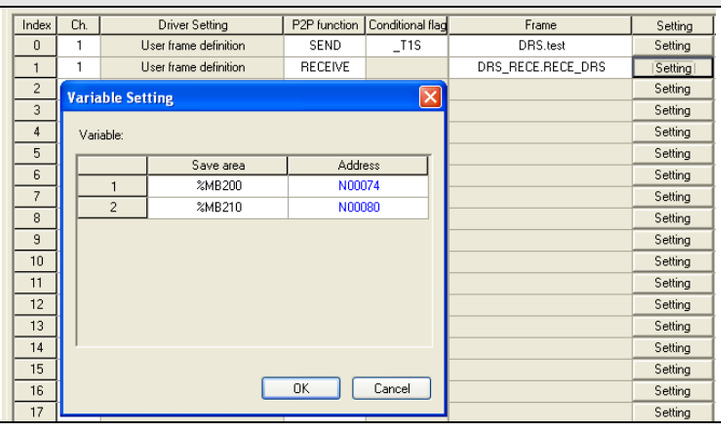
<table>
<tr><th colspan="2">frame that requests reading data (transmission frame)</th></tr>
<tr><th>Sequence</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td> 
</td></tr>
<tr><td>1. After standard settings, double-click P2P 01 in the P2P window.
2. Input no. of base and slot where Cnet I/F module is equipped.
3. Double-click P2P Channel and select User frame definition in Channel 2.</td></tr>
<tr><td rowspan="2">2</td><td> 
</td></tr>
<tr><td>1. Click user definition frame and click right button of mouse.
2. Click ‘Add Group’ and input group name (DRS) and select frame type as transmission.</td></tr>
<tr><td rowspan="2">3</td><td> 
</td></tr>
<tr><td>1. Click ‘Add Frame’ and select type HEAD, TAIL, BODY and input BODY name.
2. BODY’s name is test here.</td></tr>
</table>

Sequence	Setting method
4	 1. If the user double-clicks HEAD, segment setting window named DRS.HEAD is created. 2. Name of segment setting window is different according to frame (frame name.HEAD/TAIL/BODY name) 3. Double-click data window. Select Numerical constant as Form and input 2 as Data. 02 means STX as ASCII code.
5	 1. If the user double-clicks TAIL, segment setting window named DRS.TAIL is created. 2. Double-click data window. Select Numerical constant as Form and input D and A as Data. 0D and 0A means CR and LF as ASCII code respectively.
6	 1. If the user double-clicks BODY, segment setting window named DRS.test is created. 2. Writes frame that requests reading continuous 2 data values starting no. 1 of D register of station no. 1. 3. When writing frame, one frame's size is less than 10.
7	 1. This is result of entire frame that request reading data.

▶Writing frame to receive response frame of temperature controller

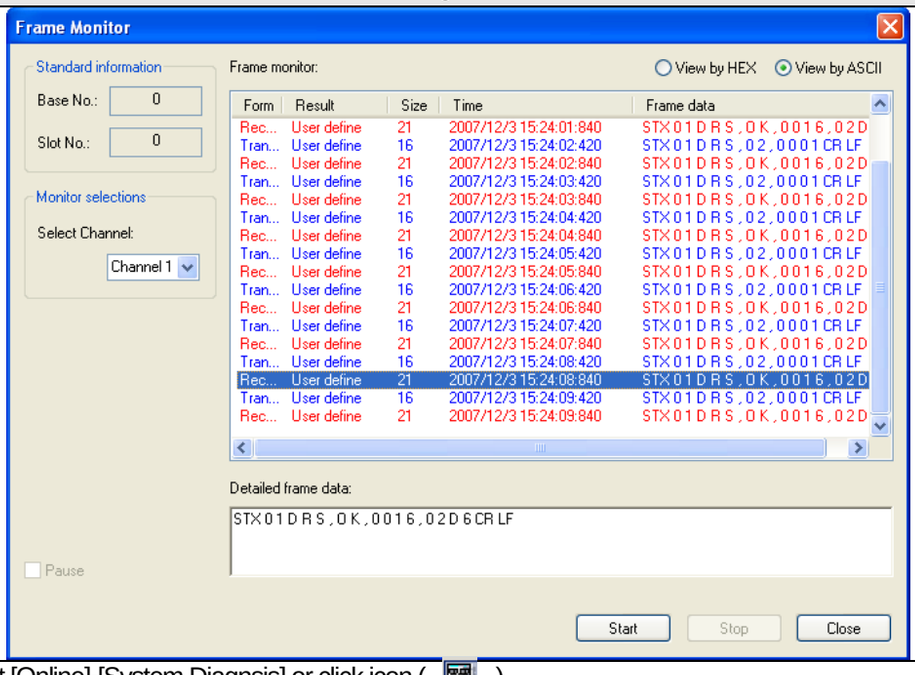
<table>
<tr><th colspan="2">Writing response frame (Reception frame)</th></tr>
<tr><th>Sequence</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>
</td></tr>
<tr><td>1. Write like step 2 of frame that request reading data.
2. Frame name is DRS_RECE.</td></tr>
<tr><td rowspan="2">2</td><td> 
</td></tr>
<tr><td>1. Click ‘Add Frame’ and select HEAD, TAIL, BODY as type and input BODY name.
2. BODY’s name is RECE_DRS here.</td></tr>
<tr><td>3</td><td>1. Method writing HEAD, TAIL is same with step 4~5 of method writing frame that request reading data.</td></tr>
<tr><td rowspan="2">4</td><td> 
</td></tr>
<tr><td>1. To save present temperature value in MB200 and setting value in MB210, set the storage area of 1st and 2nd data.
2. Since data size of data 1 and 2 is 4 byte, select Fix sized variable and input 4 in Size
3. To select storage area of data, check Assign memory.</td></tr>
<tr><td rowspan="2">5</td><td> 
</td></tr>
<tr><td>1. This is entire frame to receive response data of temperature controller.</td></tr>
</table>

▶ Writing frame

Sequence	Setting method
1	 1. Double-click P2P block of P2P 01. 2. Input channel (User definition frame) which is selected in P2P channel. 3. In the P2P function, in case of transmission frame, select SEND and in case of reception frame, select RECEIVE. 4. Conditional flag is activated when P2P function is SEND. 5. To read data every second, input _T1s in Conditional flag. 6. Click setting and set the storage area of present value and setting value.
2	Refer to 9.1.2 and execute writing parameter and enabling link.

▶Checking data

Check if written frame is communicated normally.

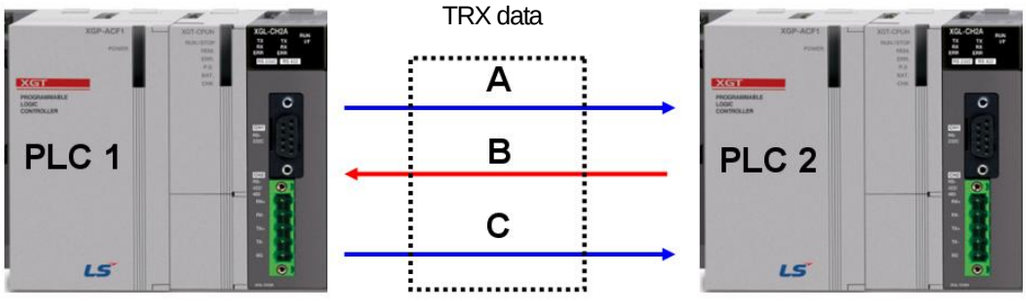
Sequence	Setting method
1	 1. Select [Online]-[System Diagnsis] or click icon ( ) 2. After clicking relevant module and click right button of mouse, select Status by service or frame monitor. 3. When frame is not dealt with properly, unknown message is displayed.
2	Check device area by device monitor of XG-5000.

10.4.2 Using P2P flag as conditional flag

▶What is P2P flag?

P2P flag means flag that is turned on when receiving frame is completed according to eight P2P blocks in case of Use P2P settings. Since P2P flag keeps its status, when using P2P flag as conditional flag, the user should reset that flag.

▶Operation



▷ PCL 1 transmits frame named ‘A’ every 2 seconds.
▷ PLC 2 transmits frame named ‘B’ as soon as it receives fame named ‘A’.
▷ PLC 1 transmits frame named ‘C’ as soon as it receives frame named ‘B’.[note1)]

Note1) In example, PLC 1, PLC 2 is used to account for easily. The following program is written in one the system where two XGL-CH2A s are equipped and they communicate through RS-232C.

▶System configuration

Describes system configuration and operation method

	PLC 1	PLC 2	Reference
CPU	XGK-CPUH	XGK-CPUH	
Communication module	XGL-CH2A	XGL-CH2A	
Operation mode	Use P2P settings	Use P2P settings	
Protocol	User frame definition	User frame definition	
Type	RS-232C	RS-232C	
Speed	115,200	115,200	
Data bit	8	8	
Stop bit	1	1	
Parity bit	None	None	
Station no.	0	0	
P2P number	P2P 02	P2P 03	
Operation	1. PCL 1 transmits frame named ‘A’ every 2 seconds. 2. PLC 2 transmits frame named ‘B’ as soon as it receives fame named ‘A’. 3. PLC 1 transmits frame named ‘C’ as soon as it receives frame named ‘B’.		

▶P2P flag number

P2P 02		P2P 03	
Flag name	Device address	Flag name	Device address
_P2P2_NDR00	L10090	_P2P3_NDR00	L13930
_P2P2_NDR01	L10150	_P2P3_NDR01	L13990
_P2P2_NDR02	L10210	_P2P3_NDR02	L14050

▶Frame structure

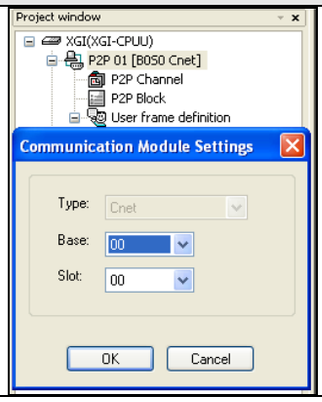
PLC 1			PLC 2		
Frame name	Operation	Data	Frame name	Operation	Data
Send 1	Transmission	A	Rece1	Reception	A
Rece1	Reception	B	Send 1	Transmission	B
Send 1	Transmission	C	Rece1	Reception	C

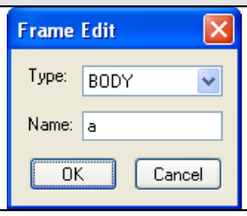
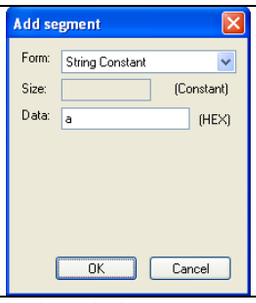
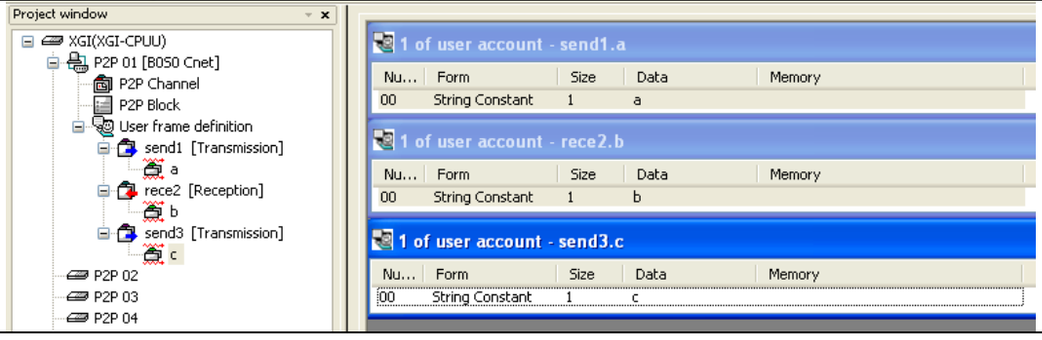
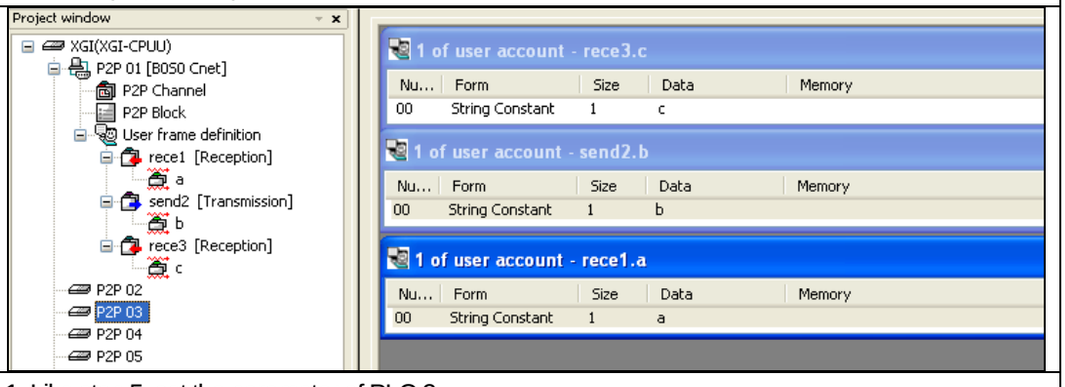
▶Standard settings

Refer to setting method when acting as P2P service of 10.1.2

▶Writing frame

Describes how to write frame in XG-PD

Sequence	Setting method
1	
	1. After standard settings, double-click P2P 01 in the P2P window. 2. Input no. of base and slot where Cnet I/F module is equipped. 3. Double-click P2P Channel and select User frame definition in Channel 1.
2	
	1. Click user definition frame and click right button of mouse. 2. Input Group name and select Frame type

<table>
<tr><th>Sequence</th><th>Setting method</th></tr>
<tr><td>3</td><td> 
</td></tr>
<tr><td></td><td>1. Input frame name and select frame type like above figure
2. Click send1[Transmission] and click right button of mouse
3. Click Add frame and input body name</td></tr>
<tr><td>4</td><td> 
</td></tr>
<tr><td></td><td>1. Double-click BODY. Then segment setting window named send1.a shows.
2. Name of segment setting window is different according to frame.
(frame name.HEAD/TAIL/BODY name)
3. Double-click data window. Then above window shows.
4. Select ‘String Constant’ as Form and input ‘a’ as Data.</td></tr>
<tr><td>5</td><td> 
</td></tr>
<tr><td></td><td>1. Like step 4, set the parameter of PLC 1.</td></tr>
<tr><td>6</td><td> 
</td></tr>
<tr><td></td><td>1. Like step 5, set the parameter of PLC 2.</td></tr>
</table>

▶P2P Block setting

<table>
<tr><th colspan="2">Setting of PLC 1</th></tr>
<tr><th>Sequence</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td>
<table>
<tr><th>Index</th><th>Ch.</th><th>Driver Setting</th><th>P2P function</th><th>Conditional flag</th><th>Frame</th></tr>
<tr><td>0</td><td>1</td><td>User frame definition</td><td>SEND</td><td>F00094</td><td>send1.a</td></tr>
<tr><td>1</td><td>1</td><td>User frame definition</td><td>RECEIVE</td><td></td><td>rece2.b</td></tr>
<tr><td>2</td><td>1</td><td>User frame definition</td><td>SEND</td><td>L010150</td><td>send3.c</td></tr>
</table>
</td></tr>
<tr><td>1. Double-click P2P block of P2P 02
2. Input channel which (user definition frame) was selected in the P2P channel.
3. In P2P function, in case of transmission frame, select SEND and in case of reception frame, select RECEIVE.
4. Conditional flag is activated when P2P function is SEND.
5. Since first frame of PLC 1 is transmitted every 2 seconds, input F92.
6. Select frame referring to frame name of PLC 1 in above frame structure.
7. Since send3.c is sent when receiving ‘b’, input L010150 which means completion of receiving first data of P2P 2 as conditional flag</td></tr>
<tr><th colspan="2">Setting of PLC 2</th></tr>
<tr><td rowspan="2">2</td><td>
<table>
<tr><th>Index</th><th>Ch.</th><th>Driver Setting</th><th>P2P function</th><th>Conditional flag</th><th>Frame</th></tr>
<tr><td>0</td><td>1</td><td>User frame definition</td><td>RECEIVE</td><td></td><td>rece1.a</td></tr>
<tr><td>1</td><td>1</td><td>User frame definition</td><td>SEND</td><td>L013930</td><td>send2.b</td></tr>
<tr><td>2</td><td>1</td><td>User frame definition</td><td>RECEIVE</td><td></td><td>rece3.c</td></tr>
</table>
</td></tr>
<tr><td>1. Referring to above frame, input P2P block like step 1</td></tr>
</table>

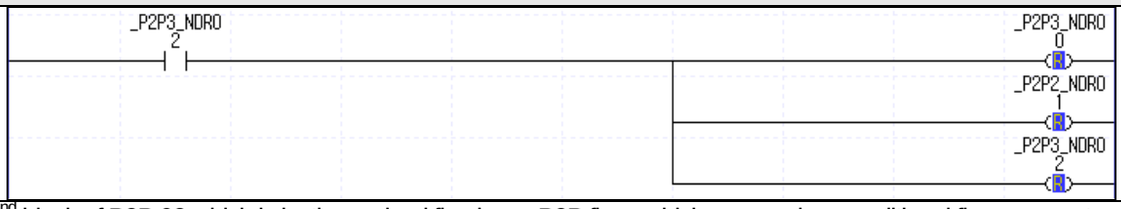
▶Writing parameter

Refer to writing parameter of 10.1.2

▶Program to reset P2P flag

Since P2P flag keeps its value after on, for continuous communication, P2P flag should be reset every scan. To make program, reset device address of P2P flag used as conditional flag by using reset coil after lastly received flag is on.

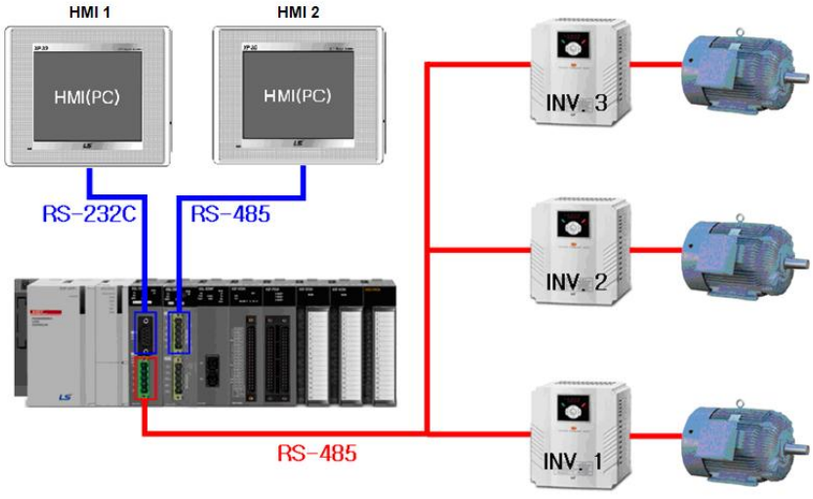
Program



1. If 2nd block of P2P 03 which is lastly received flag is on, P2P flags which are used as conditional flag are reset.
2. Since finally 2nd block of P2P 03 is rest, when communicating next frames, each flag keeps off status. Frame is sent by acknowledge rising edge (0 to 1)

10.5 Communication between HMI and inverter through Cnet I/F module

Describes how to control PMU and inverter when configuring system like [Figure 10.4] where Cnet modules act as XGT server and Modbus client respectively.



[Figure 10.4] System configuration where Cnet I/F modules act as XGT server and Modbus client respectively

▶Operation of HMI (XP 50)

By communication between XP 50 (HMI made by LSIS) and Cnet I/F module, monitoring lower device and operation can be executed. XP 50 is the highest device and it always acts as client (master). Cnet I/F module respond to XP 50 and it acts as server.

▶Operation of inverter

SV-iG5A, our small capacity inverter which is connected through Cnet I/F module, is controlled by PLC program. At this time, Cnet I/F module acts as client (master) and SV-IG5A acts as server.

▶System operation

Describes about system configuration of [Figure 10.4]

▶Communication parameter

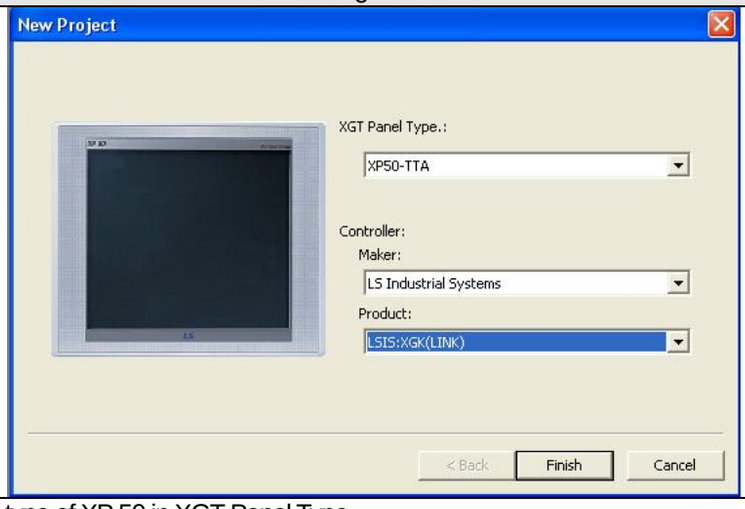
	XP 50 1	XP 50 2	SV-iG5A
Type	RS-232C	RS-485	RS-485
Speed	38,400	38,400	19,200
Data bit	8	8	8
Stop bit	1	1	1
Parity bit	None	None	None
Modem type	None	None	None
Station no.*note1	1	1	1~3

Note1) In case Cnet I/F's channels are different, station number's duplication is available.

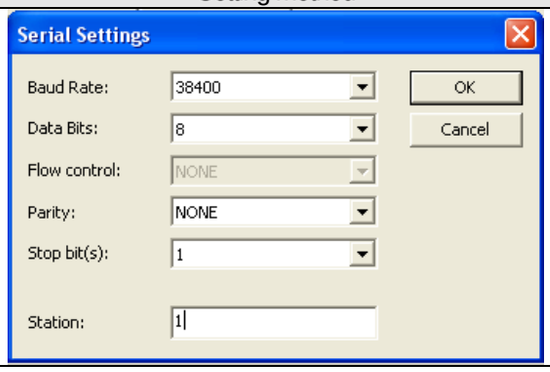
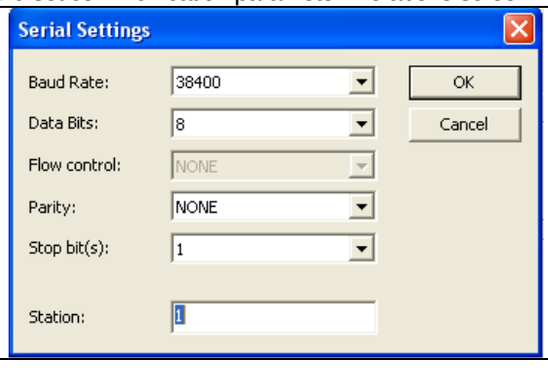
▶ Description of operation

Device name	Operation contents
XP 50 1	M1 bit on: inverter 1 forward rotation M2 bit on: inverter 2 forward rotation M3 bit on: inverter 3 forward rotation M4 bit on: inverter 1 reverse rotation M5 bit on: inverter 2 reverse rotation M6 bit on: inverter 3 reverse rotation M7 bit on: inverter 1 stop M8 bit on: inverter 1 stop M9 bit on: inverter 1 stop
XP 50 2	M20 bit on: inverter 1 increasing speed M24 bit on: inverter 2 increasing speed M27 bit on: inverter 3 increasing speed M121 bit on: inverter 1 decreasing speed M125 bit on: inverter 2 decreasing speed M128 bit on: inverter 3 decreasing speed
XGL-CH2A(channel 1)	Executes request from PMU 1
XGL-CH2A(channel 2)	Acts as Modbus RTU client and controls inverter (SV-iG5A)
XGL-C42A(channel 1)	Executes request from PMU 2
SV-iG5A	Acts as Modbus RTU server and executes request from XGL-CH2A (channel 2)

▶ Setting in XP_Builder (XP 50 editor)

Sequence	Setting method
1	
	1. Select model type of XP 50 in XGT Panel Type 2. Controller means which communication module acting as server is used. Select LSIS:XGT(LINK) 3. Click OK and draw XP 50 referring to XP_Builder user manual.

▶ Setting in XP_Builder

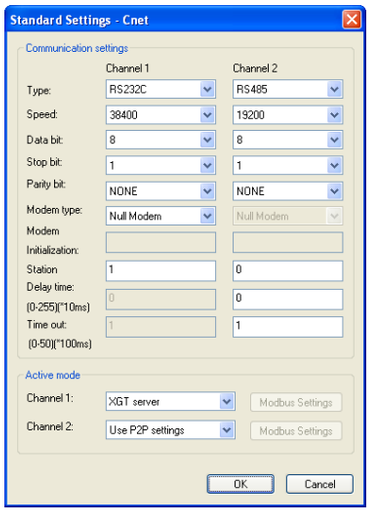
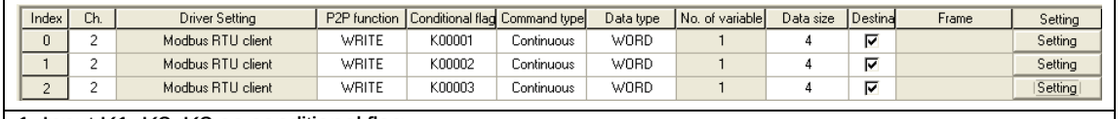
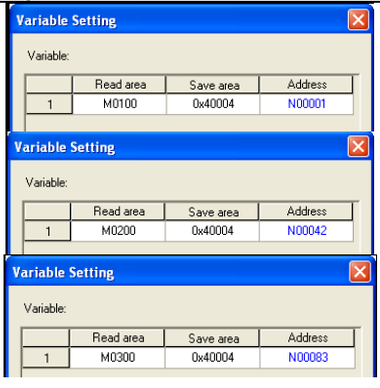
Sequence	Setting method
1	
	1. setting of XP 50 1 1) Select [Common]-[Project Property Setting]-[XGT Panel Settings] 2) Set protocol as RS-232C. 3) Click [Detail Settings] and set communication parameter like above screen.
2	
	1. setting of XP 50 2 1) Select [Common]-[Project Property Setting]-[XGT Panel Settings] 2) Set protocol as RS-422/485. 3) Click [Detail Settings] and set communication parameter like above screen.

▶ Setting in inverter

For more detail about inverter, refer to user manual of SV-iG5A in our homepage (http://eng.lsis.biz)

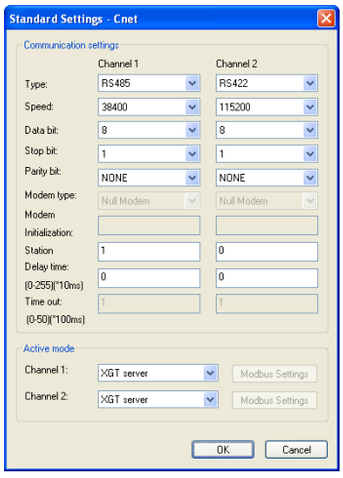
Sequence	Setting method
1	(1)Drv setting (Operation order method): 3 (RS 485) (2)Frq setting (Frequency setting method): 7 (RS 485)
2	(1)I59 (Communication protocol): 0 (Modbus RTU) (2)I60 (Inverter station no.): 1~3 (one per one inverter) (3)I61(Communication speed): 4 (19,200[BPS]) (4)I65 (Parity/Stop bit): 0(parity(none), stop bit(1))

▶ Setting in XGL-CH2A

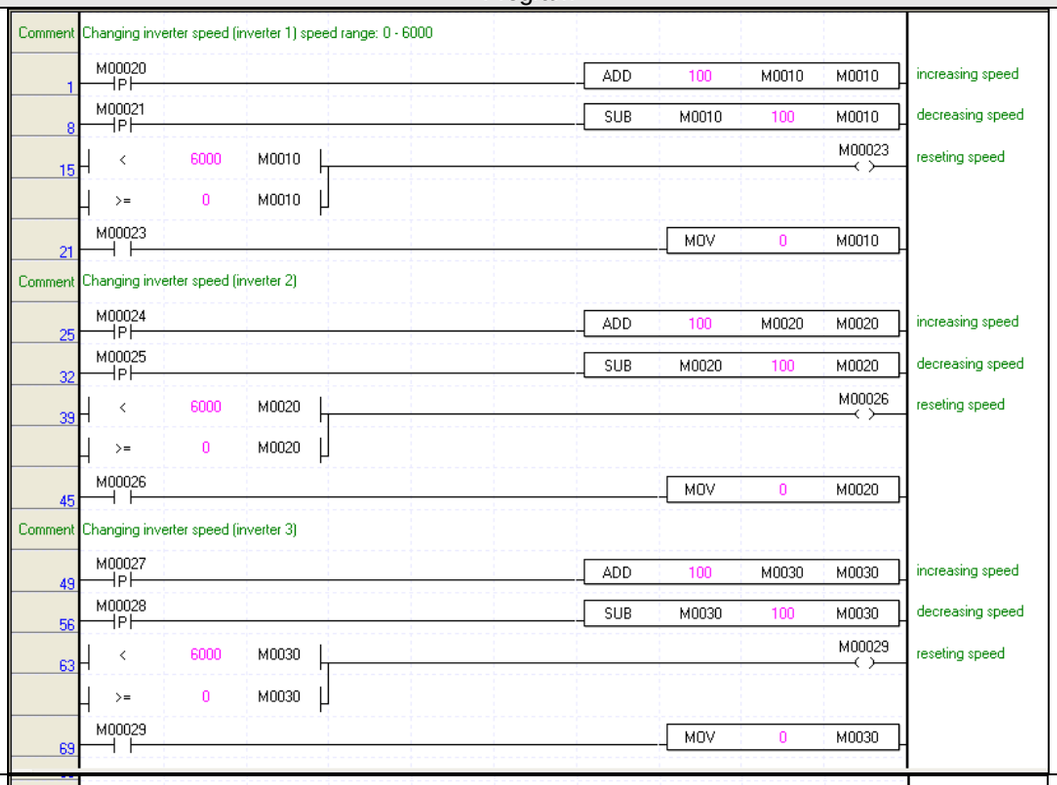
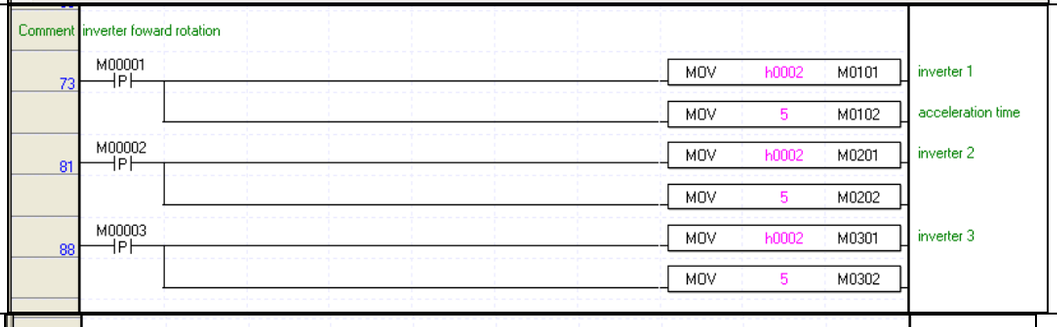
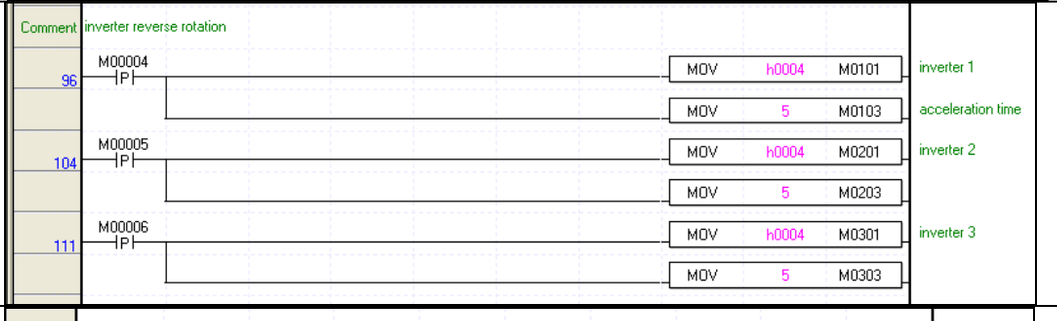
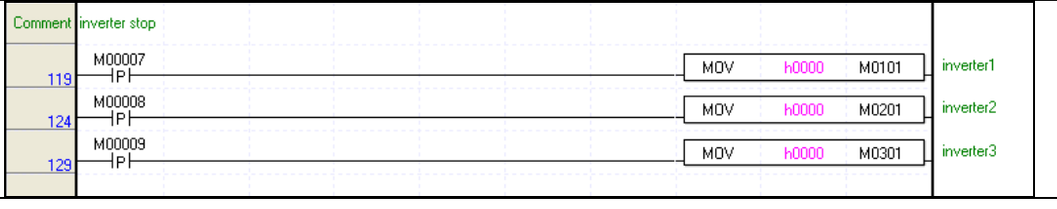
<table>
<tr><th>Sequence</th><th>Setting method</th></tr>
<tr><td rowspan="2">1</td><td> 
</td></tr>
<tr><td>1. In case of channel 1, setting method when acting as XGT server of 9.2.1 is same and set the communication parameter to be same with PMU 1 setting value of 9.5.3
2. In case of channel 2, setting method when acting as Modbus client of 9.3.2 is same and set the communication parameter to be same with SV-iG5A setting value of 9.5.3</td></tr>
<tr><td rowspan="2">2</td><td> 
</td></tr>
<tr><td>1. Input K1, K2, K3 as conditional flag</td></tr>
<tr><td rowspan="2">3</td><td> 
</td></tr>
<tr><td>1. Start address to control inverter 1is M100 and start address of inverter to save that data is 0x40004[note1)]
2. Start address to control inverter 1is M200 and start address of inverter to save that data is 0x40004
3. Start address to control inverter 1is M300 and start address of inverter to save that data is 0x40004</td></tr>
</table>

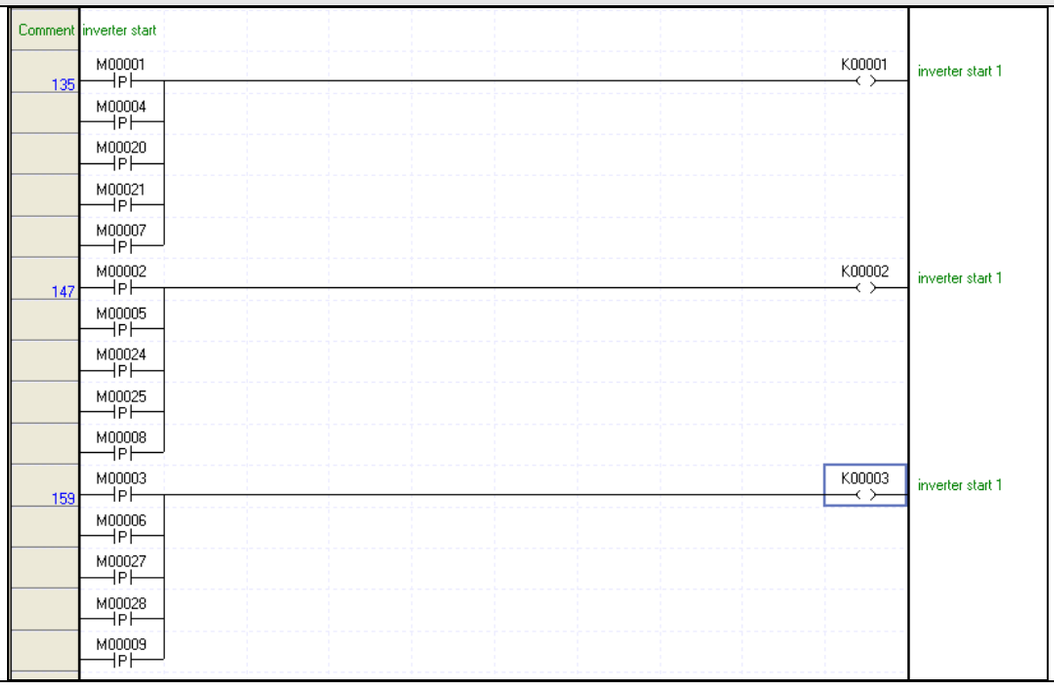
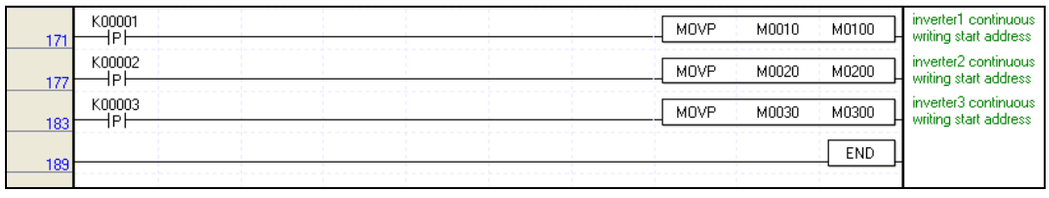
Note1) For more detail according to Modbus address, refer to chapter 8 parameter code list.

▶ Setting in XGL-C22A

Sequence	Setting method
1	
	1. In case of channel 1, setting method when acting as XGT server of 10.2.1 is same and set the communication parameter to be same with PMU 2 setting value of 10.5.3

▶ XG 5000 program

Sequence	Program
1	
2	
3	
4	

Sequence	Program
5	
6	

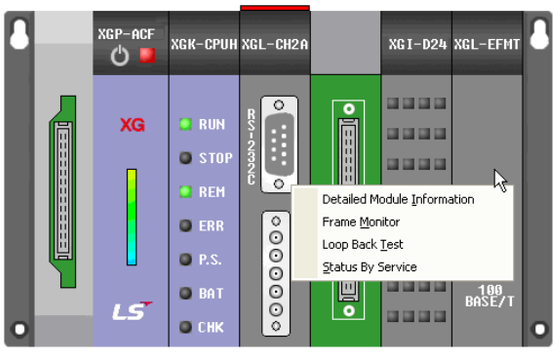
Chapter 11 Diagnosis

With XG-PD used, the status of the system and the network can be checked and diagnosed.
Diagnosis function is composed as described below.

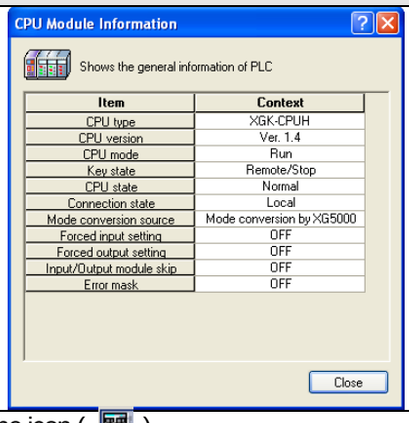
- ▶ CPU status
- ▶ Communication module information
- ▶ Frame monitoring
- ▶ Loop Back test
- ▶ Status by service

11.1 Diagnosis Function of XG-PD

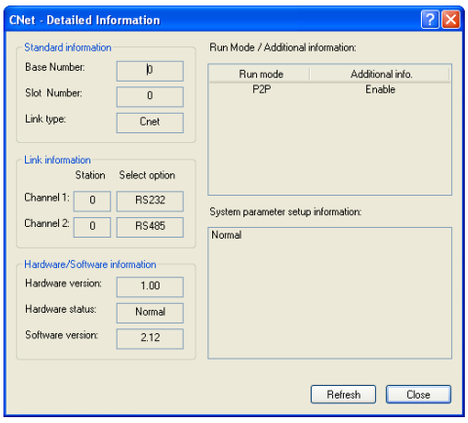
How to diagnosis system and network status by XG-PD system diagnosis are described below.

Setting contents	Setting method
System diagnosis	
1. Select [Online] – [System Dianosis] and click the icon ( ). 2. Click the right button on the the relevant module and click Frame Monitor or Status By Service to check.	

▶ **Checking the CPU status**

Check list	Detail result
CPU Module information	
1. Select [Online] – [System Diagnosis] or click the icon ( ). 2. Click the right button on the the CPU module and click CPU module information.	

▶ Communication module information

Check list	Detail result
Communication module information	

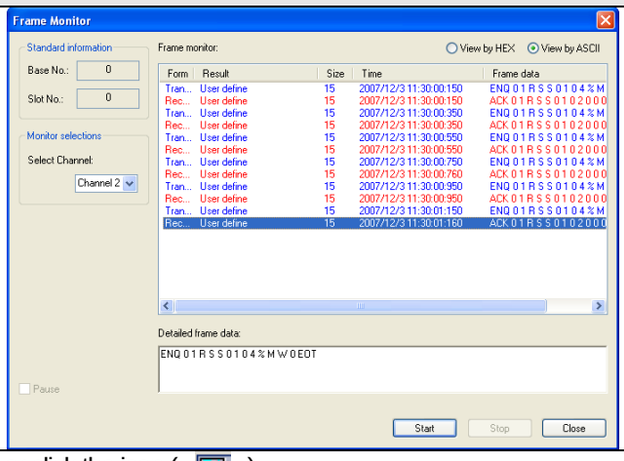
1. Select [Online] – [System Diagnosis] or click the icon ( ).
2. Click the right button on the the relevant module and click Detailed information.

▶ **Meaning of communication module information item**

Item			Contents
Standard information	Base Number		Information of base number under diagnosis
	Slot Number		Information of slot number under diagnosis
	Link Type		Type of communication module under diagnosis
Link information	Station		Station address used in the dedicated service and P2P
	Select Option		Information about communication type (RS-232C, RS-422)
Hardware/Software information	Hardware version		Hardware version of communication module
	Hardware status		Hardware status of communication module
	Software version		OS version of communication module
RUN mode/ Additional information	Run mode		Service information (dedicated service, P2P)
	Additional info.	P2P	Enable/Disable
		Dedicated service	Indicates the driver type of dedicated service
		PADT	Indicates the remote 1/2 connection
System parameter setup information			Indicates if standard parameter is downloaded or not. Error information of standard communication parameter

▶ **Frame monitor**

The user can check the TRX frame of Cnet module by using the frame monitor.

Check list	Detail result
Frame monitor	

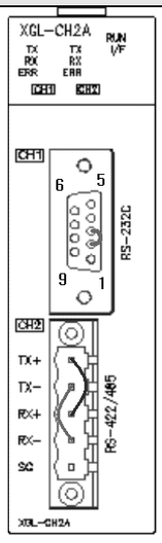
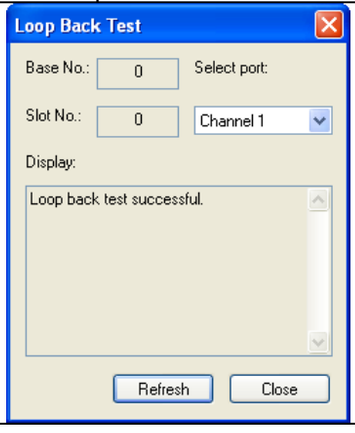
Frame Monitor
Standard information
Base No.: 0
Slot No.: 0
Monitor selections
Select Channel:
Channel 2
Pause
Frame monitor:
View by HEX
View by ASCII
Form
Result
Size
Time
Frame data
Tran... User define 15 2007/12/3 11:30:00:150 ENQ 0 1 R S S 0 1 0 4 % M
Rec... User define 15 2007/12/3 11:30:00:150 ACK 0 1 R S S 0 1 0 2 0 0 0
Tran... User define 15 2007/12/3 11:30:00:350 ENQ 0 1 R S S 0 1 0 4 % M
Rec... User define 15 2007/12/3 11:30:00:350 ACK 0 1 R S S 0 1 0 2 0 0 0
Tran... User define 15 2007/12/3 11:30:00:550 ENQ 0 1 R S S 0 1 0 4 % M
Rec... User define 15 2007/12/3 11:30:00:550 ACK 0 1 R S S 0 1 0 2 0 0 0
Tran... User define 15 2007/12/3 11:30:00:750 ENQ 0 1 R S S 0 1 0 4 % M
Rec... User define 15 2007/12/3 11:30:00:750 ACK 0 1 R S S 0 1 0 2 0 0 0
Tran... User define 15 2007/12/3 11:30:00:950 ENQ 0 1 R S S 0 1 0 4 % M
Rec... User define 15 2007/12/3 11:30:00:950 ACK 0 1 R S S 0 1 0 2 0 0 0
Tran... User define 15 2007/12/3 11:30:01:150 ENQ 0 1 R S S 0 1 0 4 % M
Rec... User define 15 2007/12/3 11:30:01:160 ACK 0 1 R S S 0 1 0 2 0 0 0
Detailed frame data:
ENQ 0 1 R S S 0 1 0 4 % M W 0 EOT
Start
Stop
Close

1. Select [Online] – [System Diagnosis] or click the icon ( ).
2. Click the right button on the the Cnet module and click Frame Monitor to check.

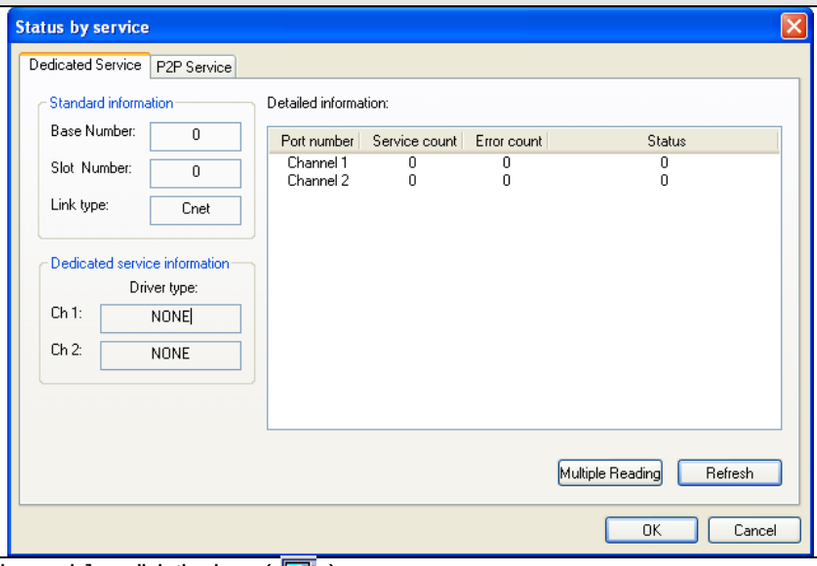
▶ Detail of frame monitor items

Item		Contents
Standard information	Base No.	Information of base number under diagnosis
	Slot No.	Information of slot number under diagnosis
Monitor selections	Select Channel	Select channel to monitor
Frame monitor window	From	Indicates whether it is TX or RX frame.
	Result	Indicates the protocol type 1) XGT server 2) XGT client 3) Modbus server 4) Modbus client 5) User definition frame 6) Unknown: frame that Cnet can't deal with
	Size	Size of frame
	Time	Time when sending/receiving the frame
	Frame data	Indicates the frame data
View by HEX		Indicates the frame data as HEX
View by ASCII		Indicates the frame data as ASCII
Start		Starts the frame monitor
Stop		Stops the frame monitor

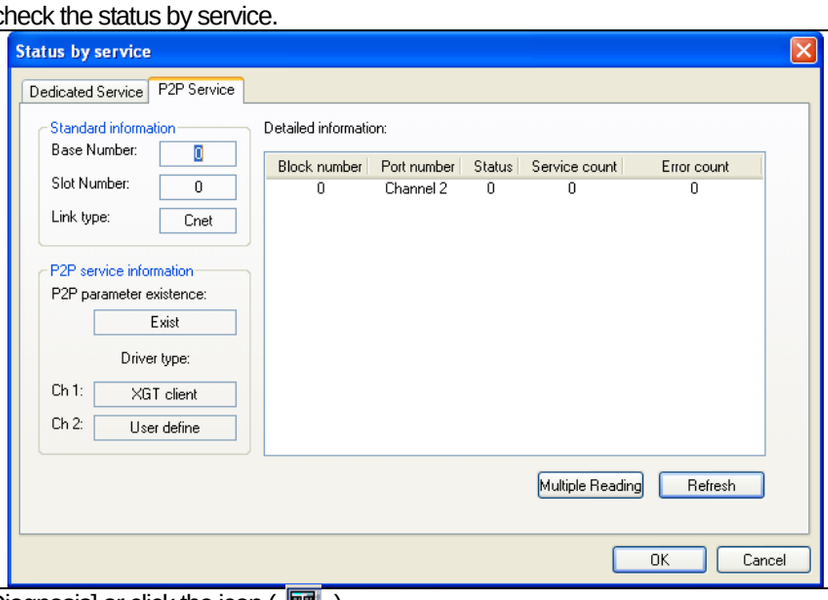
▶ Loop back test

Check list	Detail result
How to wire the module	
1. Set actiive mode of test module as server. 2. Disable the P2P link of test module. 3. Wire like figure below according to communication port. (1) RS-232C communication: connect no. 2 with no. 3 (2) RS-422/485 communication: connect TX+ with RX+ and TX- with RX- 4. Select [Online] – [System Diagnosis] or click the icon ( ). 5. Click the right button on the the Cnet module and click Loop Back test to check.	
Loop Back test	
1. Select channel to test and click ‘Refresh’	

▶ Status by service

Check list	Detail result
Dedicated service	

1. Select [Online] – [System Diagnosis] or click the icon ( ).
2. Click the right button on the the Cnet I/F module and click Status By Service.
3. Click Dedicated Service tap.
4. Click Multiple reading and check the status by service.

P2P service	

1. Select [Online] – [System Diagnosis] or click the icon ( ).
2. Click the right button on the the Cnet I/F module and click Status By Service.
3. Click P2P Service tap.
4. Click Multiple reading and check the status by service.

▶ Meaning of status by service

Classification	Item		Contents
Dedicated Service	Standard information	Base Number	Information of base number under diagnosis
		Slot Number	Information of slot number under diagnosis
		Link type	Type of communication module under diagnosis
	Dedicated service information		Drive type by service
	Detailed information window	Port number	Channel number
		Service count	Indicates how many dedicated service communication is done
		Error count	Indicates how many error occurs during dedicated service communication
		Status	Indicates status of dedicated service communication
P2P Service	Standard information	Base Number	Information of base number under diagnosis
		Slot Number	Information of slot number under diagnosis
		Link type	Type of communication module under diagnosis
	P2P service information	P2P parameter existence	Indicates whether P2P parameter exists or not
		Driver type	Indicates the P2P driver by port XGT/Modbus/User definition frame
	Detailed information	Block number	Available range:0~63 Only block under operation is indicated.
		Port number	Indicates the channel number
		Status	Indicates the status by service
		Service count	Indicates how many P2P service is done.
		Error count	Indicates how many error occurs during service
Multiple reading/ Refresh	Multiple reading		Checks the P2P service status every second.
	Refresh		Check the P2P service status when refresh is done.

▶ Error according to status code by service
It is used to check whether Cnet I/F module is normal or not.

Dedicated service		P2P service	
Status	Meaning	Status	Meaning
0	Normal	0	Normal
1	Error of RX frame head (There is no ACK/NAK.)	4	Error of max. station number (Available range: 0~31)
2	Error of RX frame tail (There is no tail.)	5	Time out
3	BCC error of RX frame	FFFE	1. Modbus address error 2. Commands except Read/Write are used.
9	Station number of RX frame is different with self station number (Self station number = 0)	-	
0A	In case of not get response from CPU		
0B	RX frame size exceeds the modbus max. frame size		
0C	RX frame is not Modbus ASCII/RTU.		
0D	HEX conversion error in Modbus		

11.2 Error code by protocol

Error code by protocol

▶XGT client/server

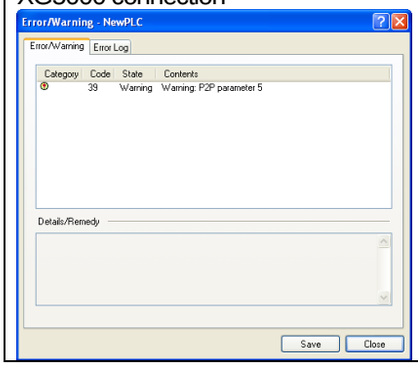
Error code	Error type	Error content and reason	Ex. of error frame
0003	No. of block excess error	No. of block is larger than 16 when requesting reading/writing single data	01rSS1105%MW10…
0004	Variable length error	Variable length is larger than 16 (16 is max.)	01rSS0113%MW10000000…
0007	Data type error	Received data type is not X, B, W, D, L	01rSS0105%MK10
0011	Data error	Error of data length area information	01rSB05%MW10%4
		Not starting with %	01rSS0105$MW10
		Area value of variable is not normal	01rSS0105%MW^&
		In case of writing Bit, it should 00 or 01. But it doesn't use 00 or 01.	01wSS0105%MX1011
0090	Monitor execution error	Requests executing not registered monitor	-
0190	Monitor execution error	Excess of registration number range	-
0290	Monitor registration error	Excess of registration number range	-
1132	Device memory error	Character is input instead of device name	-
1232	Data size error	Excess of data size (60 Word is maximum)	01wSB05%MW1040AA5512,.
1234	Frame excess error	There are unnecessary contents in frame	01rSS0105%MW10000
1332	Data type non-coincidence error	In case of writing/reading single data, all data type should be same. But it doesn't	01rSS0205%MW1005%MB10
1432	Data value error	Impossible to converter data value to Hex	01wSS0105%MW10AA%5
7132	Variable request area excess error	In case of exceeding supported area of device	01rSS0108%MWFFFFF

▶Modbus ASCII/RTU client/server

Error code	Error type	Meaning
01	Function code error	Function code error
02	Address error	Address allowed range excess error
03	Data setting error	Not allowed data error
04	Server error	Server error
05	Server re-transmission request	There are too many data for server to deal with data now. So server requests client to transmit request again later.
06	Server process time delay	It takes much time for server to deal with data. Client should request again.

11.3 Trouble Shooting by Error

11.3.1 Trouble shooing when P2P parameter setting error occurs in case of XG500 connection

Phenomenon	Reason	Trouble shooting
P2P setting error warning in case of XG5000 connection 	Cnet I/F module applying P2P setting is removed.	1. Turn off and check if module is removed or not 2. connect XG5000 and check
	In case of enabling link, the user enabled the link where P2P is not set	1. In Enable Link menu of XG5000, check P2P setting number and delete P2P number not selected properly. 2. After disconnecting XG-PD, connect XG5000 again and check

11.3.2 Trouble shooting when communication is not done after P2P client setting

Phenomenon	Reason	Trouble shooting
Tough communication setting is completed, Tx/Rx LED of Cnet I/F doesn't flicker	In case CPU is stop mode	Connect XG5000 and check CPU mode. If CPU mode is stop, change mode into RUN.
	Non-coincidence of communication standard parameter between client and server	Connect XG-PD and click [File] – [Open from PLC]. Check standard settings
	Enable Link setting error	After executing P2P parameter, enable right P2P link

11.3.3 Trouble shooting when response frame is missed in case of acting as client and using RS-485

Phenomenon	Reason	Trouble shooting
After setting diverse P2P parameter in P2P block, if frame monitor is executed, response frame is missed.	In case P2P conditional flag is faster than communication time	1. Consider communication time and change P2P conditional flag. 2. Communication time: transmission time + reception time - transmission time: conditional flag+CPU Scan Time+reaction time of communication module+data transmission time - reception time: CPU Scan Time + reaction time of communication module+data transmission time
	In case that response time of partner is slow.	1. Increase Delay time in standard settings of XG-PD. - Because response speed is different, set value range of 3~8.

11.3.4 Two response frame are dealt with as unknown when executing frame monitor

Phenomenon	Reason	Trouble shooting
Two response frame are dealt with as unknown when executing frame monitor Transmission XGT master 17 2007/12/4 ... ENQ 0 1 r S S 0 1 0 4 % M W 0 EOT 4 0 Reception Unknown 17 2007/12/4 ... ENQ 0 1 r S S 0 1 0 4 % M W 0 EOT 4 0 Reception Unknown 17 2007/12/4 ... ACK 0 1 r S S 0 1 0 2 0 0 0 0 ETX 0 5 Transmission XGT master 17 2007/12/4 ... ENQ 0 1 r S S 0 1 0 4 % M W 0 EOT 4 0	Communication type in XG-PD is set as RS-422 but output wiring method is RS-485	Change communication type in XG-PD or wiring method

11.3.5 Unavailable to execute individual reset

Phenomenon	Reason	Trouble shooting
Unavailable to execute individual reset	OS version Cnet I/F module is less than 2.0	Upgrade version of Cnet I/F module more than 2.0

11.3.6 Unable to analyze TRX frame

Phenomenon	Reason	Trouble shooting
Unable to analyze TRX frame	More than one server sends frame	1. Execute 1:1 communication with server and check if it works properly. 2. Take interlock for servers not to sends frame simultaneously.
	In case parity bit setting is not coincident	Set the parity bit to be same each other
	In case stop bit setting is not coincident	Set the stop bit to be same each other
	In case communication speed setting is not coincident	Set the communication speed to be same each other
	In case of multi drop, terminal resistance is not installed	Install terminal resistance

11.3.7 Unable to know which one is reason of error, client or server

Phenomenon	Reason	Trouble shooting
Unable to know which one is reason of error, client or server	-	1. Check Cnet I/F module - Check module's equipment status - Check wiring 2. Execute Loop Back test 3. Check CPU status

11.3.8 Communication is not normal or communication is not executed repeatedly

Phenomenon	Reason	Trouble shooting
Communication is not normal or communication is not executed repeatedly	In case of multi drop, More than one server sends frame	1. Execute 1:1 communication with server and check if it works properly. 2. Take interlock for servers to sends frame simultaneously.
	Connection error of wiring communication line	Change cable or check connection of cable
	In case of RS-485 (Half duplex), non-coincidence of timing of TRX signal	Increase delay time of client and server
	1. When transmission is not complete, it requests next process of transmission 2. When reception is not complete, it requests next process of reception	Use handshake in program thoroughly

11.3.9 When error code of Status by Service is “E000”

Phenomenon	Reason	Trouble shooting
Status of P2P service is E000	Setting Station no. in XG-PD is not normal.	Check server’s station no and change station no. of standard settings in XG-PD

11.3.10 When error code of Status by Service is “E001”

Phenomenon	Reason	Trouble shooting
Status of P2P service is E000	Check-sum of CRC error is different	Refer to frame and check calculation result of CRC

Appendix

A. 1 Definition of Terms

(1) Communication type

(a) Simplex

This is the communication type that data is transferred in a constant direction. Information can not be transferred in the reverse direction.

(b) Half-Duplex

Data is transferred in two ways with one cable if time interval provided, though it can't be transferred simultaneously.

(c) Full-Duplex

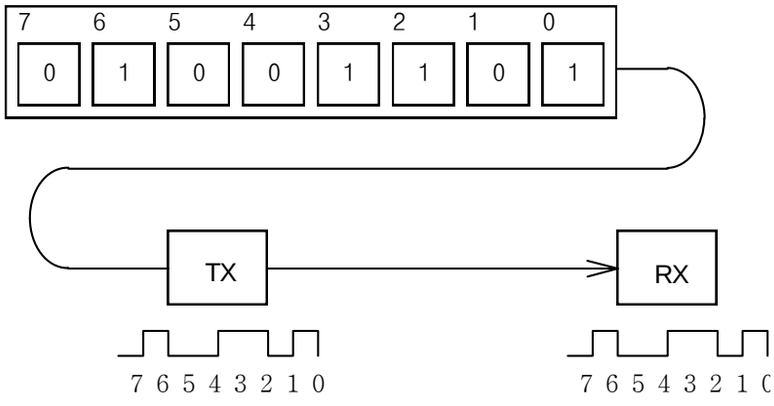
Data is simultaneously transferred and received in two ways with two cables.

(2) Transmission type

This is divided into the following 2 types in consideration of the speed, safety and economy on transmission in binary (bit composed of 0 and 1).

(a) Serial transmission

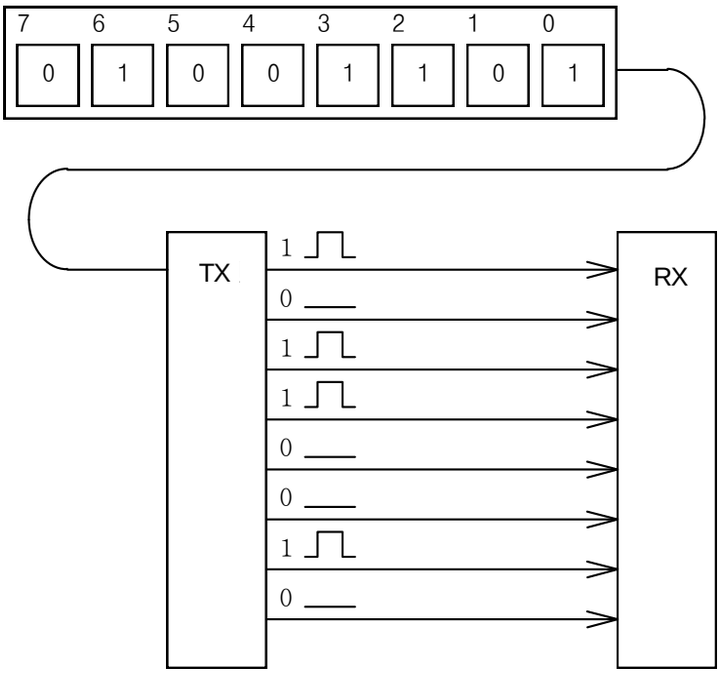
This type transmits bit by bit via 1 cable. The speed of transmission is slow, but the cost of installation is low and the software is simplified.



RS-232C, RS-422 and RS-485 are the examples.

(b) Parallel transmission

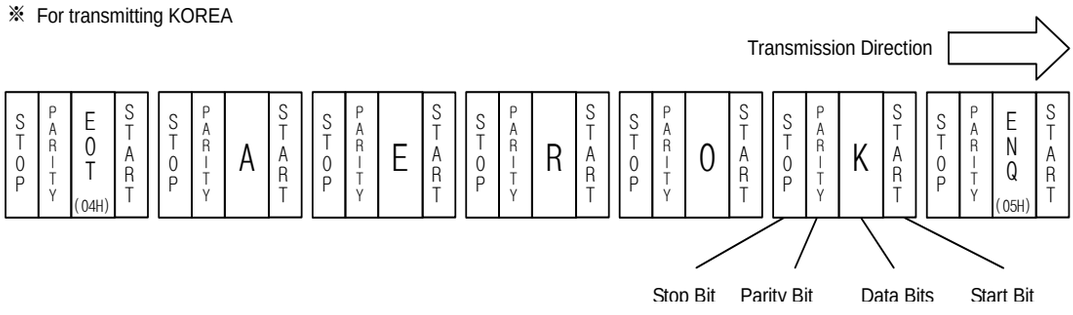
This type is used in printer, etc., which transmits data in unit of 1 byte, so the speed is high and the accuracy of data is reliable. However, the longer the transmission distance is, the higher the cost of installation is geometrically.



(3) Asynchronous communication

This communication type transmits characters one by one synchronously in serial transmission. At this time, synchronous signal (Clock, etc.) is not transmitted. Character code is transmitted with a start bit attached to the head of 1 character, and it is finished with a stop bit attached to the tail.

※ For transmitting KOREA



(4) Protocol

This is communication rule established in relation between the transmission side and the receiving side of information in order to send and accept information between two computers/terminals or more without error, effectively, and reliably. In general, this specifies call establishment, connection, structure of message exchange form, re-transmission of error message, procedure of line inversion, and character synchronization between terminals, etc.

(5) BPS(Bits Per Second) and CPS(Characters Per Second)

BPS is a unit of transfer rate that represents how many bits are transferred per second. CPS is the number of the characters transferred for a second. Generally, one character is 1Byte (8Bits), so CPS is the number of bytes which can be transferred per second.

(6) Node

Node is a term that means the connected nodes of the data in the network tree structure, generally network is composed of a great number of nodes, and is also expressed as the station number.

(7) Packet

Packet, a compound term of package and bucket used for packet exchange type to send information as divided in a unit of packet, separates transferred data into the defined length to add a header that presents the correspondent addresses (station No., etc.) thereto.

(8) Port

Port is meant to be the part of the data process device which sends or receives the data from a remote control terminal in data communications, but in Cnet serial communication is meant to be the RS-232C or RS-422 port.

(9) RS-232C

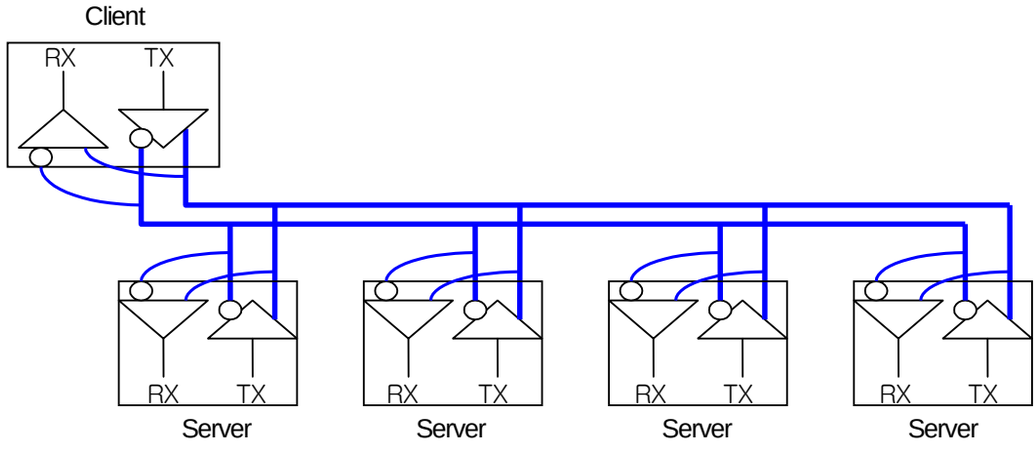
RS-232C is the interface to link a modem with a terminal and to link a modem with a computer, and is also the serial communications specification established by EIA according to the recommendations of the CCITT. This is also used to link the null modem directly as well as the modem linkage. The disadvantage is that the transfer length is short and that only 1 : 1 communication is available, and the specifications which have overcome this disadvantage are RS-422 and RS-485.

(10) RS-422/RS-485

As one of the serial transmission specifications, its transferring length is long with 1 : N connection available compared to RS-232C. The difference of these two specifications is that RS-422 uses 4 signals of TX(+), TX(-), RX(+) and RX(-), while RS-485 has 2 signals of (+) & (-), where data is sent and received through the same signal line. Accordingly, RS-422 executes the full-duplex type of communication and RS-485 executes the half-duplex type of communication.

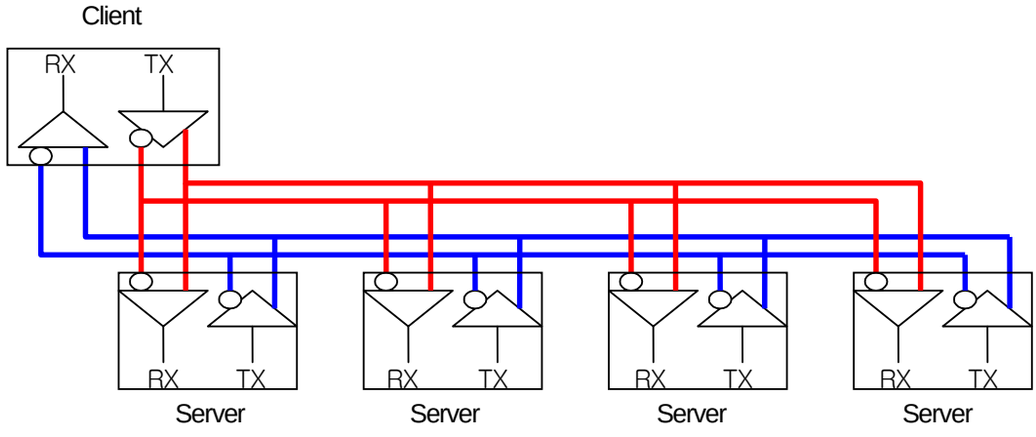
(11) Half Duplex Communication

Two-way communication is available, however simultaneous communication of transmission & receiving isn't available. This communication type is applied to RS-485 for instance. It is used a lot for multi-drop communication type which communicates via one signal line by several stations. Half Duplex Communication results from the transmission characteristic performed by stations one by one not allowing simultaneous transmission by multi stations due to the data damage of data impact caused by the simultaneous multi-transmission of the stations. The figure below shows an example of structure based on Half Duplex Communication. Each station in communication with the terminal as linked with each other can send or receive data via one line so to execute communication with all stations, where multi-sever is advantageously available.



(12) Full Duplex Communication

Two way-communications of simultaneous transmission & receiving is available. This communication type is applied to RS-232C & RS-422. Since the transmission line is separated from the receiving line, simultaneous transmission & receiving is available without data impact, so called as Full Duplex Communication. The figure shows an example of structure based on RS-422 of Full Duplex Communication. Since transmission terminal of the client station and receiving terminals of the sever stations are connected to one line, and transmission terminals of the sever stations are linked with receiving terminal of the client station, the communication between sever stations is unavailable with the restricted function of multi-sever.

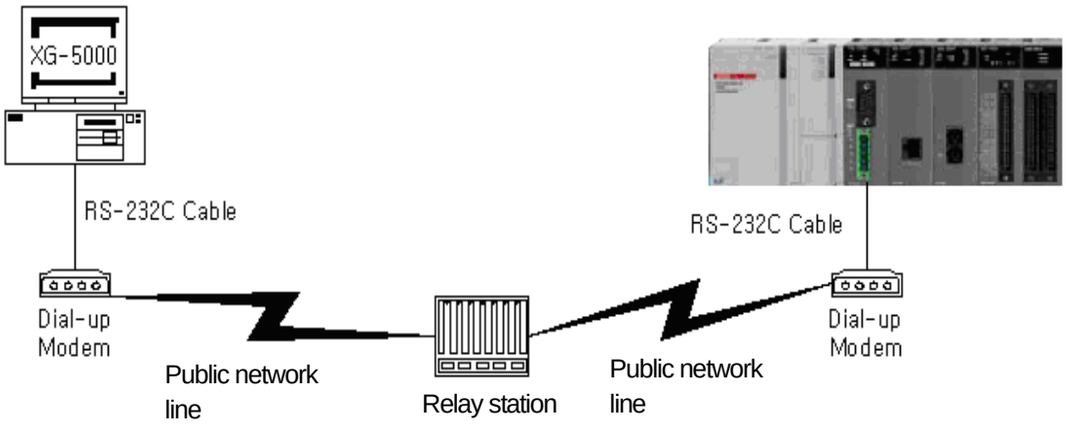


(13) BCC(Block Check Character)

As serial transmission may have signals distorted due to undesirable noise in transmission line, BCC is used as data to help receiving side to check the signals if normal or distorted and to detect errors in signals as compared with the received BCC after calculating BCC by receiving side itself using the data input to the front terminal of BCC.

(14) XG5000 function

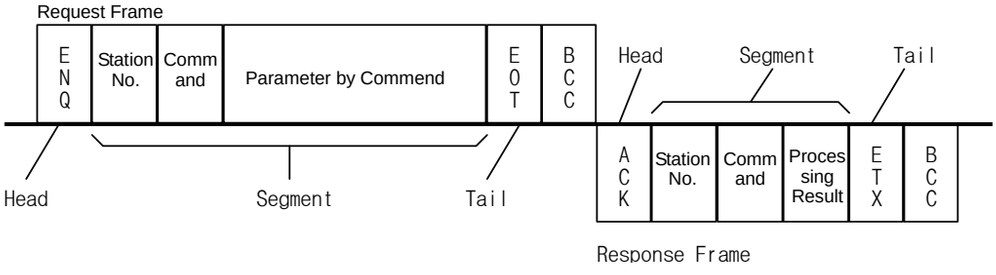
This is the function to remotely perform programming, reading/writing user's program, debugging, and monitoring, etc. without moving the physical connection of XG5000 in the network system where PLC is connected to Cnet I/F module. Especially, it is convenient to control a remote PLC via modem.



* XG5000: Programming software of XGT PLC for Windows.

(15) Frame

Frame is composed of transmitted and received data as in a specified form in data communication including additional information of segments [station No., command, parameter by command], control characters [ENQ, ACK, EOT, ETX] for synchronization, parity for detecting error, and BCC. The structure of frame used for serial communication of Cnet is as follows.



[Structure of general Tx/Rx frame]

- Head: ASCII value indicating frame start.
- Tail: ASCII value indicating frame end.
- BCC (Block Check Character)
  - Check data for Tx/Rx frame
  - Used to inspect reliability of data with such various methods as ADD, OR, Exclusive OR, MULTPLY, etc.

(16) Reset

This function is used to initialize the communication module with errors.

Use XG-PD to select [On-Line] → [Reset] so to execute Reset, which will restart PLC.

A. 2 Flag List

A.2.1 Special Relays List (F)

Device 1	Device 2	Type	Variable	Function	Description
F0000	-	DWORD	_SYS_STATE	Mode & Status	PLC mode & run status displayed.
	F00000	BIT	_RUN	RUN	RUN status.
	F00001	BIT	_STOP	STOP	STOP status.
	F00002	BIT	_ERROR	ERROR	ERROR status.
	F00003	BIT	_DEBUG	DEBUG	DEBUG status.
	F00004	BIT	_LOCAL_CON	Local control	Local control mode.
	F00005	BIT	_MODBUS_CON	Modbus mode	Modbus control mode.
	F00006	BIT	_REMOTE_CON	Remote mode	Remote control mode.
	F00008	BIT	_RUN_EDIT_ST	Modification during run	Program being downloaded during run.
	F00009	BIT	_RUN_EDIT_CHK	Modification during run	Modification in progress during run.
	F0000A	BIT	_RUN_EDIT_DONE	Modification complete during run	Modification complete during run.
	F0000B	BIT	_RUN_EDIT_END	Modification complete during run	Modification complete during run.
	F0000C	BIT	_CMOD_KEY	Run Mode	Run Mode changed by key.
	F0000D	BIT	_CMOD_LPADT	Run Mode	Run Mode changed by local PADT.
	F0000E	BIT	_CMOD_RPADT	Run Mode	Run Mode changed by remote PADT.
	F0000F	BIT	_CMOD_RLINK	Run Mode	Run Mode changed by remote communication module.
	F00010	BIT	_FORCE_IN	Compulsory input	Compulsory input status.
	F00011	BIT	_FORCE_OUT	Compulsory output	Compulsory output status.
	F00012	BIT	_SKIP_ON	I/O SKIP	I/O SKIP being executed.
	F00013	BIT	_EMASK_ON	Error mask	Error mask being executed.
	F00014	BIT	_MON_ON	Monitor	Monitor being executed.
	F00015	BIT	_USTOP_ON	STOP	Stopped by STOP function
	F00016	BIT	_ESTOP_ON	ESTOP	Stopped by ESTOP function.
	F00017	BIT	_CONPILE_MODE	compiling	Compile being performed.
	F00018	BIT	_INIT_RUN	Initializing	Initialization task being performed.
	F0001C	BIT	_PB1	Program code 1	Program code 1 selected.
	F0001D	BIT	_PB2	Program code 2	Program code 2 selected.
	F0001E	BIT	_CB1	Compile code 1	Compile code 1 selected.
	F0001F	BIT	_CB2	Compile code 2	Compile code 2 selected.

Device 1	Device 2	Type	Variable	Function	Description
F0002	-	DWORD	_CNF_ER	System error	Serious error in system reported.
	F00020	BIT	_CPU_ER	CPU error	CPU configuration error found.
	F00021	BIT	_IO_TYER	Module type error	Module type not identical.
	F00022	BIT	_IO_DEER	Module installation error	Module displaced.
	F00023	BIT	_FUSE_ER	Fuse error	Fuse blown.
	F00024	BIT	_IO_RWER	Module I/O error	Module I/O error found.
	F00025	BIT	_IP_IFER	Module interface error	Error found in Special/ communication module interface.
	F00026	BIT	_ANNUM_ER	External equipment Error	Serious error detected in external equipment.
	F00028	BIT	_BPRM_ER	Basic parameter	Basic parameter abnormal.
	F00029	BIT	_IOPRM_ER	IO parameter	IO configuration parameter abnormal.
	F0002A	BIT	_SPPRM_ER	Special module parameter	Special module parameter abnormal.
	F0002B	BIT	_CPPRM_ER	Communication module parameter	Communication module parameter abnormal.
	F0002C	BIT	_PGM_ER	Program error	Program error found.
	F0002D	BIT	_CODE_ER	Code error	Program code error found.
	F0002E	BIT	_SWDT_ER	System watch-dog	System watch-dog active.
	F0002F	BIT	_BASE_POWER_ER	Power error	Base power abnormal.
	F00030	BIT	_WDT_ER	Scan watch-dog	Scan watch-dog active.
F0004	-	DWORD	_CNF_WAR	System warning	Slight error in system reported.
	F00040	BIT	_RTC_ER	RTC error	RTC data abnormal.
	F00041	BIT	_DBCK_ER	Back-up error	Data back-up error found.
	F00042	BIT	_HBCK_ER	Restart error	Hot restart unavailable.
	F00043	BIT	_ABSD_ER	Run error stop	Stopped due to abnormal run.
	F00044	BIT	_TASK_ER	Task impact	Task being impacted.
	F00045	BIT	_BAT_ER	Battery error	Battery status abnormal.
	F00046	BIT	_ANNUM_WAR	External equipment error	Slight error detected in external equipment.
	F00047	BIT	_LOG_FULL	Memory full	Log memory full
	F00048	BIT	_HS_WAR1	HS link 1	HS link – parameter 1 error
	F00049	BIT	_HS_WAR2	HS link 2	HS link – parameter 2 error
	F0004A	BIT	_HS_WAR3	HS link 3	HS link – parameter 3 error
	F0004B	BIT	_HS_WAR4	HS link 4	HS link – parameter 4 error
	F0004C	BIT	_HS_WAR5	HS link 5	HS link – parameter 5 error
	F0004D	BIT	_HS_WAR6	HS link 6	HS link – parameter 6 error
	F0004E	BIT	_HS_WAR7	HS link 7	HS link – parameter 7 error

Device 1	Device 2	Type	Variable	Function	Description
F0004	F0004F	BIT	_HS_WAR8	HS link 8	HS link – parameter 8 error
	F00050	BIT	_HS_WAR9	HS link 9	HS link – parameter 9 error
	F00051	BIT	_HS_WAR10	HS link 10	HS link – parameter 10 error
	F00052	BIT	_HS_WAR11	HS link 11	HS link - parameter11 error
	F00053	BIT	_HS_WAR12	HS link 12	HS link - parameter12 error
	F00054	BIT	_P2P_WAR1	P2P parameter 1	P2P - parameter1 error
	F00055	BIT	_P2P_WAR2	P2P parameter 2	P2P – parameter2 error
	F00056	BIT	_P2P_WAR3	P2P parameter 3	P2P – parameter3 error
	F00057	BIT	_P2P_WAR4	P2P parameter 4	P2P – parameter4 error
	F00058	BIT	_P2P_WAR5	P2P parameter 5	P2P – parameter5 error
	F00059	BIT	_P2P_WAR6	P2P parameter 6	P2P – parameter6 error
	F0005A	BIT	_P2P_WAR7	P2P parameter 7	P2P – parameter7 error
	F0005B	BIT	_P2P_WAR8	P2P parameter 8	P2P – parameter8 error
	F0005C	BIT	_CONSTANT_ER	Fixed cycle error	Fixed cycle error
F0009	-	WORD	_USER_F	User contact point	Timer available for user.
	F00090	BIT	_T20MS	20ms	CLOCK of 20ms cycle.
	F00091	BIT	_T100MS	100ms	CLOCK of 100ms cycle.
	F00092	BIT	_T200MS	200ms	CLOCK of 200ms cycle.
	F00093	BIT	_T1S	1s	CLOCK of 1s cycle.
	F00094	BIT	_T2S	2s	CLOCK of 2s cycle.
	F00095	BIT	_T10S	10s	CLOCK of 10s cycle.
	F00096	BIT	_T20S	20s	CLOCK of 20s cycle.
	F00097	BIT	_T60S	60s	CLOCK of 60s cycle.
	F00099	BIT	_ON	Always ON	Bit always ON.
	F0009A	BIT	_OFF	Always OFF	Bit always OFF
	F0009B	BIT	_1ON	1 scan ON	Bit only ON for the first scan.
	F0009C	BIT	_1OFF	1 scan OFF	Bit only OFF for the first scan.
	F0009D	BIT	_STOG	Reverse	Every scan reversed.
F0010	-	WORD	_USER_CLK	User CLOCK	CLOCK available to set by user.
	F00100	BIT	_USR_CLK0	Repeat specific scan	ON/OFF CLOCK 0 for specific scan
	F00101	BIT	_USR_CLK1	Repeat specific scan	ON/OFF CLOCK 1 for specific scan
	F00102	BIT	_USR_CLK2	Repeat specific scan	ON/OFF CLOCK 2 for specific scan
	F00103	BIT	_USR_CLK3	Repeat specific scan	ON/OFF CLOCK 3 for specific scan
	F00104	BIT	_USR_CLK4	Repeat specific scan	ON/OFF CLOCK 4 for specific scan
	F00105	BIT	_USR_CLK5	Repeat specific scan	ON/OFF CLOCK 5 for specific scan
	F00106	BIT	_USR_CLK6	Repeat specific scan	ON/OFF CLOCK 6 for specific scan
	F00107	BIT	_USR_CLK7	Repeat specific scan	ON/OFF CLOCK 7 for specific scan

Device 1	Device 2	Type	Variable	Function	Description
F0011	-	WORD	_LOGIC_RESULT	Logic result	Logic result displayed.
	F00110	BIT	_LER	Calculation error	ON for 1 scan if calculation in error.
	F00111	BIT	_ZERO	Zero flag	ON if calculation result is 0.
	F00112	BIT	_CARRY	Carry flag	ON if Carry found during calculation.
	F00113	BIT	_ALL_OFF	Whole output OFF	ON if all output OFF
	F00115	BIT	_LER_LATCH	Calculation error latch	ON kept if calculation in error.
F0012	-	WORD	_CMP_RESULT	Compared result	Compared result displayed.
	F00120	BIT	_LT	LT flag	ON if “less than”
	F00121	BIT	_LTE	LTE flag	ON if “less than or equal”
	F00122	BIT	_EQU	EQU flag	ON if “equal”
	F00123	BIT	_GT	GT flag	ON if “greater than”
	F00124	BIT	_GTE	GTE flag	ON if “greater than or equal”
	F00125	BIT	_NEQ	NEQ flag	ON if “not equal”
F0013	-	WORD	_AC_F_CNT	Inspected power cut	Number of inspected power-cuts displayed.
F0014	-	WORD	_FALS_NUM	FALS No.	FALS No. displayed.
F0015	-	WORD	_PUTGET_ERR0	PUT/GET error 0	Main base PUT / GET error
F0016	-	WORD	_PUTGET_ERR1	PUT/GET error 1	Added base step 1 PUT / GET error
F0017	-	WORD	_PUTGET_ERR2	PUT/GET error 2	Added base step 2 PUT / GET error
F0018	-	WORD	_PUTGET_ERR3	PUT/GET error 3	Added base step 3 PUT / GET error
F0019	-	WORD	_PUTGET_ERR4	PUT/GET error 4	Added base step 4 PUT / GET error
F0020	-	WORD	_PUTGET_ERR5	PUT/GET error 5	Added base step 5 PUT / GET error
F0021	-	WORD	_PUTGET_ERR6	PUT/GET error 6	Added base step 6 PUT / GET error
F0022	-	WORD	_PUTGET_ERR7	PUT/GET error 7	Added base step 7 PUT / GET error
F0023	-	WORD	_PUTGET_NDR0	PUT/GET complete 0	Main base PUT / GET complete
F0024	-	WORD	_PUTGET_NDR1	PUT/GET complete 1	Added base step 1 PUT / GET complete
F0025	-	WORD	_PUTGET_NDR2	PUT/GET complete 2	Added base step 2 PUT / GET complete
F0026	-	WORD	_PUTGET_NDR3	PUT/GET complete 3	Added base step 3 PUT / GET complete
F0027	-	WORD	_PUTGET_NDR4	PUT/GET complete 4	Added base step 4 PUT / GET complete
F0028	-	WORD	_PUTGET_NDR5	PUT/GET complete 5	Added base step 5 PUT / GET complete
F0029	-	WORD	_PUTGET_NDR6	PUT/GET complete 6	Added base step 6 PUT / GET complete
F0030	-	WORD	_PUTGET_NDR7	PUT/GET complete 7	Added base step 7 PUT / GET complete
F0044	-	WORD	_CPU_TYPE	CPU type	Information on CPU type displayed.
F0045	-	WORD	_CPU_VER	CPU version	CPU version displayed.
F0046	-	DWORD	_OS_VER	OS version	OS version displayed.
F0048	-	DWORD	_OS_DATE	OS date	OS released date displayed.

Device 1	Device 2	Type	Variable	Function	Description
F0050	-	WORD	_SCAN_MAX	Max. scan time	Max. scan time displayed
F0051	-	WORD	_SCAN_MIN	Min. scan time	Min. scan time displayed
F0052	-	WORD	_SCAN_CUR	Present scan time	Present scan time displayed.
F0053	-	WORD	_MON_YEAR	Month / Year	PLC's time information (Month/Year)
F0054	-	WORD	_TIME_DAY	Hour / Date	PLC's time information (Hour/Date)
F0055	-	WORD	_SEC_MIN	Second / Minute	PLC's time information (Second/Minute)
F0056	-	WORD	_HUND_WK	100 years / Day	PLC's time information (100 years/Day)
F0057	-	WORD	_FPU_INFO	FPU calculation result	Floating decimal calculation result displayed.
	F00570	BIT	_FPU_LFLAG_I	Incorrect error latch	Latched if in incorrect error.
	F00571	BIT	_FPU_LFLAG_U	Underflow latch	Latched if underflow found.
	F00572	BIT	_FPU_LFLAG_O	Overflow latch	Latched if overflow found.
	F00573	BIT	_FPU_LFLAG_Z	Latch divided by 0	Latched if divided by 0.
	F00574	BIT	_FPU_LFLAG_V	Invalid calculation latch	Latched if invalid calculation.
	F0057A	BIT	_FPU_FLAG_I	Incorrect error	Reported if incorrect error found.
	F0057B	BIT	_FPU_FLAG_U	Underflow	Reported if underflow found.
	F0057C	BIT	_FPU_FLAG_O	Overflow	Reported if overflow found.
	F0057D	BIT	_FPU_FLAG_Z	Division by 0	Reported if divided by 0.
	F0057E	BIT	_FPU_FLAG_V	Invalid calculation	Reported if calculation invalid.
	F0057F	BIT	_FPU_FLAG_E	Irregular value input	Reported if irregular value input.
F0058	-	DWORD	_ERR_STEP	Error step	Error step saved.
F0060	-	DWORD	_REF_COUNT	Refresh	Increased when module refresh executed.
F0062	-	DWORD	_REF_OK_CNT	Refresh OK	Increased if module refresh normal
F0064	-	DWORD	_REF_NG_CNT	Refresh NG	Increased if module refresh abnormal.
F0066	-	DWORD	_REF_LIM_CNT	Refresh LIMIT	Increased if module refresh abnormal (TIME OUT).
F0068	-	DWORD	_REF_ERR_CNT	Refresh ERROR	Increased if module refresh abnormal.
F0070	-	DWORD	_MOD_RD_ERR_CNT	Module READ ERROR	Increased if module reads 1 word abnormally.
F0072	-	DWORD	_MOD_WR_ERR_CNT	Module WRITE ERROR	Increased if module writes 1 word abnormally.
F0074	-	DWORD	_CA_CNT	Block service	Increased if module's block data serviced
F0076	-	DWORD	_CA_LIM_CNT	Block service LIMIT	Increased if module's block data service abnormal.
F0078	-	DWORD	_CA_ERR_CNT	Block service ERROR	Increased if module's block data service abnormal.
F0080	-	DWORD	_BUF_FULL_CNT	Buffer FULL	Increased if CPU's internal buffer is FULL.
F0082	-	DWORD	_PUT_CNT	PUT count	Increased if PUT executed.
F0084	-	DWORD	_GET_CNT	GET count	Increased if GET executed.
F0086	-	DWORD	_KEY	Present key	Local key's present status displayed.
F0088	-	DWORD	_KEY_PREV	Previous key	Local key's previous status displayed.

Device 1	Device 2	Type	Variable	Function	Description
F0090	-	WORD	_IO_TYER_N	Discordant slot	Slot number with discordant module type displayed.
F0091	-	WORD	_IO_DEER_N	Displaced slot	Slot number with displaced module displayed.
F0092	-	WORD	_FUSE_ER_N	Fuse blown slot	Slot number with fuse blown displayed.
F0093	-	WORD	_IO_RWER_N	RW error slot	Slot number with module Read/Write error displayed.
F0094	-	WORD	_IP_IFER_N	IF error slot	Slot number with module interface error displayed.
F0096	-	WORD	_IO_TYER0	Module type 0 error	Main base module type error.
F0097	-	WORD	_IO_TYER1	Module type 1 error	Added base step 1 module type error.
F0098	-	WORD	_IO_TYER2	Module type 2 error	Added base step 2 module type error.
F0099	-	WORD	_IO_TYER3	Module type 3 error	Added base step 3 module type error.
F0100	-	WORD	_IO_TYER4	Module type 4 error	Added base step 4 module type error.
F0101	-	WORD	_IO_TYER5	Module type 5 error	Added base step 5 module type error
F0102	-	WORD	_IO_TYER6	Module type 6 error	Added base step 6 module type error
F0103	-	WORD	_IO_TYER7	Module type 7 error	Added base step 7 module type error
F0104	-	WORD	_IO_DEER0	Module installation 0 error	Main base module installation error
F0105	-	WORD	_IO_DEER1	Module installation 1 error	Added base step 1 module installation error
F0106	-	WORD	_IO_DEER2	Module installation 2 error	Added base step 2 module installation error
F0107	-	WORD	_IO_DEER3	Module installation 3 error	Added base step 3 module installation error
F0108	-	WORD	_IO_DEER4	Module installation 4 error	Added base step 4 module installation error
F0109	-	WORD	_IO_DEER5	Module installation 5 error	Added base step 5 module installation error
F0110	-	WORD	_IO_DEER6	Module installation 6 error	Added base step 6 module installation error
F0111	-	WORD	_IO_DEER7	Module installation 7 error	Added base step 7 module installation error
F0112	-	WORD	_FUSE_ER0	Fuse blown 0 error	Main base Fuse blown error
F0113	-	WORD	_FUSE_ER1	Fuse blown 1 error	Added base step 1 Fuse blown error
F0114	-	WORD	_FUSE_ER2	Fuse blown 2 error	Added base step 2 Fuse blown error
F0115	-	WORD	_FUSE_ER3	Fuse blown 3 error	Added base step 3 Fuse blown error
F0116	-	WORD	_FUSE_ER4	Fuse blown 4 error	Added base step 4 Fuse blown error
F0117	-	WORD	_FUSE_ER5	Fuse blown 5 error	Added base step 5 Fuse blown error
F0118	-	WORD	_FUSE_ER6	Fuse blown 6 error	Added base step 6 Fuse blown error
F0119	-	WORD	_FUSE_ER7	Fuse blown 7 error	Added base step 7 Fuse blown error
F0120	-	WORD	_IO_RWER0	Module RW 0 error	Main base module Read/Write error
F0121	-	WORD	_IO_RWER1	Module RW 1 error	Added base step 1 module Read/Write error
F0122	-	WORD	_IO_RWER2	Module RW 2 error	Added base step 2 module Read/Write error
F0123	-	WORD	_IO_RWER3	Module RW 3 error	Added base step 3 module Read/Write error
F0124	-	WORD	_IO_RWER4	Module RW 4 error	Added base step 4 module Read/Write error
F0125	-	WORD	_IO_RWER5	Module RW 5 error	Added base step 5 module Read/Write error
F0126	-	WORD	_IO_RWER6	Module RW 6 error	Added base step 6 module Read/Write error
F0127	-	WORD	_IO_RWER7	Module RW 7 error	Added base step 7 module Read/Write error

Device 1	Device 2	Type	Variable	Function	Description
F0128	-	WORD	_IO_IFER_0	Module IF 0 error	Main base module interface error
F0129	-	WORD	_IO_IFER_1	Module IF 1 error	Added base step 1 module interface error
F0130	-	WORD	_IO_IFER_2	Module IF 2 error	Added base step 2 module interface error
F0131	-	WORD	_IO_IFER_3	Module IF 3 error	Added base step 3 module interface error
F0132	-	WORD	_IO_IFER_4	Module IF 4 error	Added base step 4 module interface error
F0133	-	WORD	_IO_IFER_5	Module IF 5 error	Added base step 5 module interface error
F0134	-	WORD	_IO_IFER_6	Module IF 6 error	Added base step 6 module interface error
F0135	-	WORD	_IO_IFER_7	Module IF 7 error	Added base step 7 module interface error
F0136	-	WORD	_RTC_DATE	RTC date	RTC's present date
F0137	-	WORD	_RTC_WEEK	RTC day	RTC's present day of the week
F0138	-	DWORD	_RTC_TOD	RTC time	RTC's present time (ms unit)
F0140	-	DWORD	_AC_FAIL_CNT	Power-cut times	Power-cut times saved.
F0142	-	DWORD	_ERR_HIS_CNT	Errors found	Number of found errors saved.
F0144	-	DWORD	_MOD_HIS_CNT	Mode conversion times	Mode conversion times saved.
F0146	-	DWORD	_SYS_HIS_CNT	History updated times	System's history updated times saved.
F0148	-	DWORD	_LOG_ROTATE	Log rotate	Log rotate information saved.
F0150	-	WORD	_BASE_INFO0	Slot information 0	Main base slot information
F0151	-	WORD	_BASE_INFO1	Slot information 1	Added base step 1 slot information
F0152	-	WORD	_BASE_INFO2	Slot information 2	Added base step 2 slot information
F0153	-	WORD	_BASE_INFO3	Slot information 3	Added base step 3 slot information
F0154	-	WORD	_BASE_INFO4	Slot information 4	Added base step 4 slot information
F0155	-	WORD	_BASE_INFO5	Slot information 5	Added base step 5 slot information
F0156	-	WORD	_BASE_INFO6	Slot information 6	Added base step 6 slot information
F0157	-	WORD	_BASE_INFO7	Slot information 7	Added base step 7 slot information
F0158	-	WORD	_RBANK_NUM	Used block number	Presently used block number
F0159	-	WORD	_RBLOCK_STATE	Flash status	Flash block status
F0160	-	DWORD	_RBLOCK_RD_FLAG	Flash Read	ON when reading Flash N block data.
F0162	-	DWORD	_RBLOCK_WR_FLAG	Flash Write	ON when writing Flash N block data.
F0164	-	DWORD	_RBLOCK_ER_FLAG	Flash error	Error found during Flash N block service.
F1024	-	WORD	_USER_WRITE_F	Available contact	Contact point available in program
	F10240	BIT	_RTC_WR	RTC RW	Data Write & Read in RTC
	F10241	BIT	_SCAN_WR	Scan WR	Scan value initialization
	F10242	BIT	_CHK_ANC_ERR	Detect external serious error	Detection of serious error in external equipment requested.
	F10243	BIT	_CHK_ANC_WAR	Detect external slight error	Detection of slight error in external equipment requested.
F1025	-	WORD	_USER_STAUS_F	User contact point	User contact point
	F10250	BIT	_INIT_DONE	Initialization complete	Initialization complete displayed.
F1026	-	WORD	_ANC_ERR	External serious error information	Serious error information in external equipment displayed.

Device 1	Device 2	Type	Variable	Function	Description
F1027	-	WORD	_ANC_WAR	External slight error information	Slight error information in external equipment displayed.
F1034	-	WORD	_MON_YEAR_DT	Month / Year	Time information data (Month/Year)
F1035	-	WORD	_TIME_DAY_DT	Hour / Date	Time information data (Hour/Date)
F1036	-	WORD	_SEC_MIN_DT	Second / Minute	Time information data (Second/Minute)
F1037	-	WORD	_HUND_WK_DT	100 years / Day	Time information data (100 years/Day)

A.2.2 Communication Relays List (L)

Special register for data link

HS link No. 1 ~ 12

No.	Keyword	Type	Detail	Description
L000000	_HS1_RLINK	Bit	HS link parameter No.1's all stations normally operated	Displays all stations normally operated as specified in HS link parameter, which will be On if 1.There is no RUN mode error in all stations specified in parameter 2.All data block is in normal communication as specified in parameter. 3.The parameter specified in each station itself is in normal communication. Run_link will be kept On if once On until stopped by link disenable.
L000001	_HS1_LTRBL	Bit	After _HS1RLINK is ON, abnormal status displayed	This flag will be On if the station specified in parameter and the data block's communication status are as described below with _HSmRLINK flag On,. 1. when the station specified in parameter is not in RUN mode, 2. when the station specified in parameter is in error, 3. when data block's communication status specified in parameter is unstable, The link trouble will be On if one of those conditions 1,2 and 3 above occurs. And if such a condition is back to normal, it will be Off.
L000020 ~ L00009F	_HS1_STATE[k] (k=000~127)	Bit Array	HS link parameter No.1, Block No.k's general status displayed	Displays the general status of the communication information for the specified parameter's respective data blocks. HS1STATE[k]=HS1MOD[k]&_HS1TRX[k]&(~_HSmERR[k])
L000100 ~ L00017F	_HS1_MOD[k] (k=000~127)	Bit Array	HS link parameter No.1, Block No.k station's Run operation mode	Displays the operation mode of the station specified in parameter's data block k.
L000180 ~ L00025F	_HS1_TRX[k] (k=000~127)	Bit Array	Normal communication displayed with HS link parameter No.1, Block No.k station	Displays the communication status of parameter's data block k to check if normal as specified.
L000260 ~ L00033F	_HS1_ERR[k] (k=000~127)	Bit Array	HS link parameter No.1, Block No.k station's Run error mode	Displays the communication status of parameter's data block k to check for any error.
L000340 ~ L00041F	_HS1_SETBLOCK [k=000~127]	Bit Array	HS link parameter No.1, Block No.k setting displayed	Displays the setting status of parameter's data block k.

[Table 1] List of communication flags based on HS link number

K as a block number is displayed through 8 words by 16 for 1 word for the information of 128 blocks from 000 to 127.
For example, block information of 16~31, 32~47, 48~63, 64~79, 80~95, 96~111, 112~127 will be displayed in L00011, L00012, L00013, L00014, L00015, L00016, L00017 from block 0 to block 15 for mode information (_HS1MOD).

HS link No.	L area address	Remarks
2	L000500~L00099F	Compared with HS link of 1, other HS link station number's flag address will be simply calculated as follows; *Calculation formula: L area address = L000000 + 500 x (HS link No. – 1) In order to use HS link flag for program and monitoring, use the flag map registered in XG5000 for convenient application.
3	L001000~L00149F	
4	L001500~L00199F	
5	L002000~L00249F	
6	L002500~L00299F	
7	L003000~L00349F	
8	L003500~L00399F	
9	L004000~L00449F	
10	L004500~L00499F	
11	L005000~L00549F	

[Table 2] Relationship between HS link and L device area

P2P parameters : 1~8, P2P block : 0~63

No.	Keyword	Type	Detail	Description
L006250	_P2P1_NDR00	Bit	P2P parameter No.1, block No.00 service complete normally	P2P parameter No.1, block No.0 service complete normally
L006251	_P2P1_ERR00	Bit	P2P parameter No.1, block No.00 service complete abnormally	P2P parameter No.1, block No.0 service complete abnormally
L00626	_P2P1_STATUS00	Word	Error code if P2P parameter No.1, block No.00 service complete abnormally	Error code displayed if P2P parameter No.1, block No.0 service complete abnormally
L00627	_P2P1_SVCCNT00	DWord	P2P parameter No.1, block No.00 service normal execution times	P2P parameter No.1, block No.0 service normal execution times displayed
L00629	_P2P1_ERRCNT00	DWord	P2P parameter No.1, block No.00 service abnormal execution times	P2P parameter No.1, block No.0 service abnormal execution times displayed
L006310	_P2P1_NDR01	Bit	P2P parameter No.1, block No.01 service complete normally	P2P parameter No.1, block No.1 service complete normally
L006311	_P2P1_ERR01	Bit	P2P parameter No.1, block No.01 service complete abnormally	P2P parameter No.1, block No.1 service complete abnormally
L00632	_P2P1_STATUS01	Word	Error code if P2P parameter No.1, block No.01 service complete abnormally	Error code displayed if P2P parameter No.1, block No.1 service complete abnormally
L00633	_P2P1_SVCCNT01	DWord	P2P parameter No.1, block No.01 service normal execution times	P2P parameter No.1, block No.1 service normal execution times displayed
L00635	_P2P1_ERRCNT01	DWord	P2P parameter No.1, block No.01 service abnormal execution times	P2P parameter No.1, block No.1 service abnormal execution times displayed

[Table 3] List of communication flags based on P2P service setting

A.2.3 Link Devices List (N)

- These devices are used to save the size and the details of P2P number and block number.
- P2P No. : 1 ~ 8, P2P block: 0 ~ 63

No.	Keyword	Type	Detail	Description
N00000	_P1B00SN	Word	P2P parameter No.1, block No.00's correspondent station No.	P2P parameter No.1, block No.00's correspondent station No. saved Use P2PSN command to modify during Run if correspondent station number is used in XG-PD.
N00001 ~ N00004	_P1B00RD1	Device structure	P2P parameter No.1, block No.00 area device 1 to read	P2P parameter No.1, block No.00 area device 1 to read saved
N00005	_P1B00RS1	Word	P2P parameter No.1, block No.00 area size 1 to read	P2P parameter No.1, block No.00 area size 1 to read saved
N00006 ~ N00009	_P1B00RD2	Device structure	P2P parameter No.1, block No.00 area device 2 to read	P2P parameter No.1, block No.00 area device 2 to read saved
N00010	_P1B00RS2	Word	P2P parameter No.1, block No.00 area size 2 to read	P2P parameter No.1, block No.00 area size 2 to read saved
N00011 ~ N00014	_P1B00RD3	Device structure	P2P parameter No.1, block No.00 area device 3 to read	P2P parameter No.1, block No.00 area device 3 to read saved
N00015	_P1B00RS3	Word	P2P parameter No.1, block No.00 area size 3 to read	P2P parameter No.1, block No.00 area size 3 to read saved
N00016 ~ N00019	_P1B00RD4	Device structure	P2P parameter No.1, block No.00 area device 4 to read	P2P parameter No.1, block No.00 area device 4 to read saved
N00020	_P1B00RS4	Word	P2P parameter No.1, block No.00 area size 4 to read	P2P parameter No.1, block No.00 area size 4 to read saved
N00021 ~ N00024	_P1B00WD1	Device structure	P2P parameter No.1, block No.00 saved area device 1	P2P parameter No.1, block No.00 saved area device 1 saved
N00025	_P1B00WS1	Word	P2P parameter No.1, block No.00 saved area size 1	P2P parameter No.1, block No.00 saved area size 1 saved
N00026 ~ N00029	_P1B00WD2	Device structure	P2P parameter No.1, block No.00 saved area device 2	P2P parameter No.1, block No.00 saved area device 2 saved
N00030	_P1B00WS2	Word	P2P parameter No.1, block No.00 saved area size 2	P2P parameter No.1, block No.00 saved area size 2 saved
N00031 ~ N00034	_P1B00WD3	Device structure	P2P parameter No.1, block No.00 saved area device 3	P2P parameter No.1, block No.00 saved area device 3 saved
N00035	_P1B00WS3	Word	P2P parameter No.1, block No.00 saved area size 3	P2P parameter No.1, block No.00 saved area size 3 saved
N00036 ~ N00039	_P1B00WD4	Device structure	P2P parameter No.1, block No.00 saved area device 4	P2P parameter No.1, block No.00 saved area device 4 saved
N00040	_P1B00WS4	Word	P2P parameter No.1, block No.00 saved area size 4	P2P parameter No.1, block No.00 saved area size4 saved
N00041	_P1B01SN	Word	P2P parameter No.1, block No.01 correspondent station No.	P2P parameter No.1, block No.01's correspondent station No. saved Use P2PSN command to modify during Run if correspondent station number is used in XG-PD.
N00042 ~ N00045	_P1B01RD1	Device structure	P2P parameter No.1, block No.01 area device 1 to read	P2P parameter No.1, block No.01 device area 1 to read saved
N00046	_P1B01RS1	Word	P2P parameter No.1, block No.01 area size 1 to read	P2P parameter No.1, block No.01 area size 1 to read saved
N00047 ~ N00050	_P1B01RD2	Device structure	P2P parameter No.1, block No.01 area device 2 to read	P2P parameter No.1, block No.01 area device 1 to read saved

No.	Keyword	Type	Detail	Description
N00051	_P1B01RS2	Word	P2P parameter No.1, block No.01 area size 2 to read	P2P parameter No.1, block No.01 area size 2 to read saved
N00052 ~ N00055	_P1B01RD3	Device structure	P2P parameter No.1, block No.01 area device 3 to read	P2P parameter No.1, block No.01 area device 3 to read saved
N00056	_P1B01RS3	Word	P2P parameter No.1, block No.01 area size 3 to read	P2P parameter No.1, block No.01 area size 3 to read saved
N00057 ~ N00060	_P1B01RD4	Device structure	P2P parameter No.1, block No.01 area device 4 to read	P2P parameter No.1, block No.01 area device 4 to read saved
N00061	_P1B01RS4	Word	P2P parameter No.1, block No.01 area size 4 to read	P2P parameter No.1, block No.01 area size 4 to read saved
N00062 ~ N00065	_P1B01WD1	Device structure	P2P parameter No.1, block No.01 saved area device 1	P2P parameter No.1, block No.01 saved area device 1 saved
N00066	_P1B01WS1	Word	P2P parameter No.1, block No.01 saved area size 1	P2P parameter No.1, block No.01 saved area size 1 saved
N00067 ~ N00070	_P1B01WD2	Device structure	P2P parameter No.1, block No.01 saved area device 2	P2P parameter No.1, block No.01 saved area device 2 saved
N00071	_P1B01WS2	Word	P2P parameter No.1, block No.01 saved area size 2	P2P parameter No.1, block No.01 saved area size 2 saved
N00072 ~ N00075	_P1B01WD3	Device structure	P2P parameter No.1, block No.01 saved area device 3	P2P parameter No.1, block No.01 saved area device 3 saved
N00076	_P1B01WS3	Word	P2P parameter No.1, block No.01 saved area size 3	P2P parameter No.1, block No.01 saved area size 3 saved
N00077 ~ N00080	_P1B01WD4	Device structure	P2P parameter No.1, block No.01 saved area device 4	P2P parameter No.1, block No.01 saved area device 4 saved
N00081	_P1B01WS4	Word	P2P parameter No.1, block No.01 saved area size4	P2P parameter No.1, block No.01 saved area size 4 saved

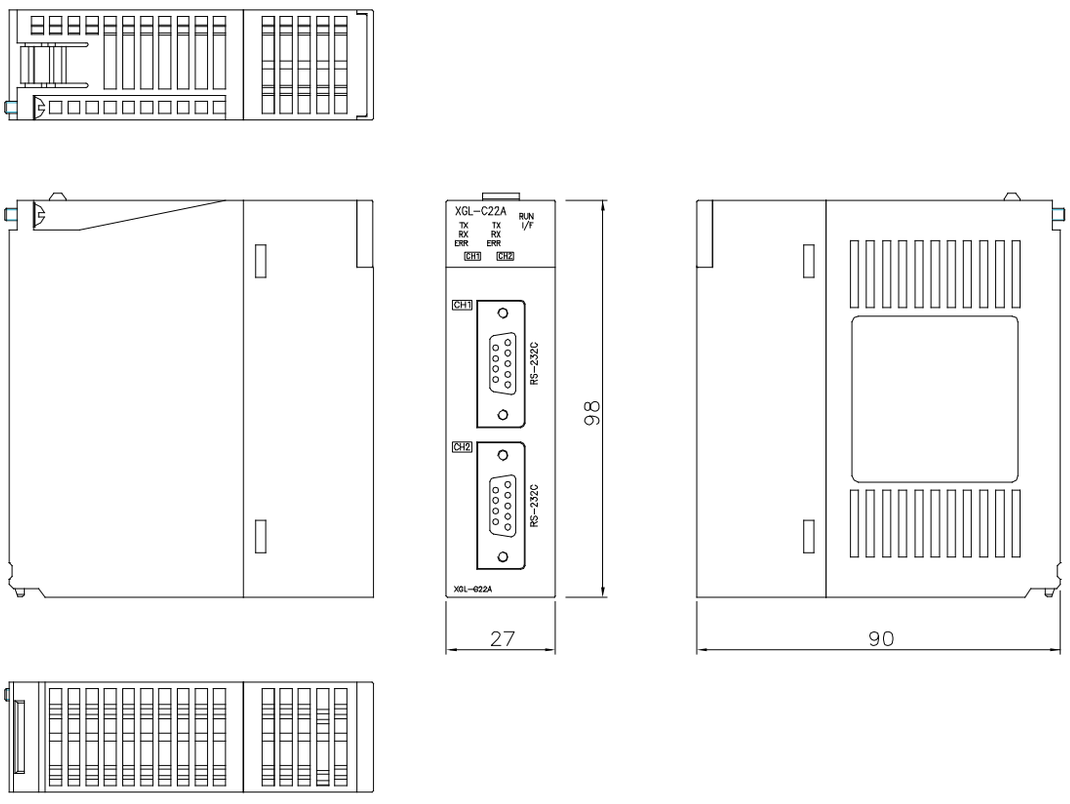
Notes

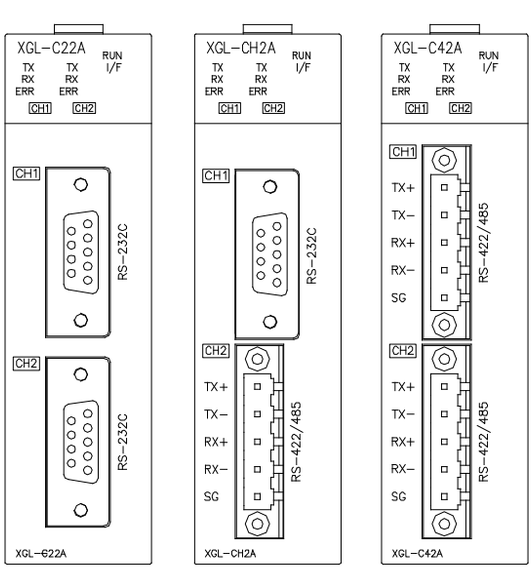
1) If P2P parameters are to be specified with XG-PD used for N area, the setting will be performed automatically. And its modification during Run is also available by P2P dedicated command.
2) Since the addresses of N area available are classified according to P2P parameter setting No. and block index No., the area not used for P2P service can be used as an internal device.

A.3 Dimension

Unit: mm

• XGL-C22A/CH2A/C42A





Warranty

1. Warranty Period

The product you purchased will be guaranteed for 18 months from the date of manufacturing.

2. Scope of Warranty

Any trouble or defect occurring for the above-mentioned period will be partially replaced or repaired. However, please note the following cases will be excluded from the scope of warranty.

(1) Any trouble attributable to unreasonable condition, environment or handling otherwise specified in the manual,
(2) Any trouble attributable to others' products,
(3) If the product is modified or repaired in any other place not designated by the company,
(4) Due to unintended purposes
(5) Owing to the reasons unexpected at the level of the contemporary science and technology when delivered.
(6) Not attributable to the company; for instance, natural disasters or fire

3. Since the above warranty is limited to PLC unit only, make sure to use the product considering the safety for system configuration or applications.

Environmental Policy

LSIS Co., Ltd supports and observes the environmental policy as below.

Environmental Management

LSIS considers the environmental preservation as the preferential management subject and every staff of LSIS use the reasonable endeavors for the pleasurably environmental preservation of the earth.

About Disposal

LSIS' PLC unit is designed to protect the environment. For the disposal, separate aluminum, iron and synthetic resin (cover) from the product as they are reusable.

LSIS values every single customers.

Quality and service come first at LSIS.

Always at your service, standing for our customers.

http://eng.lsis.biz

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